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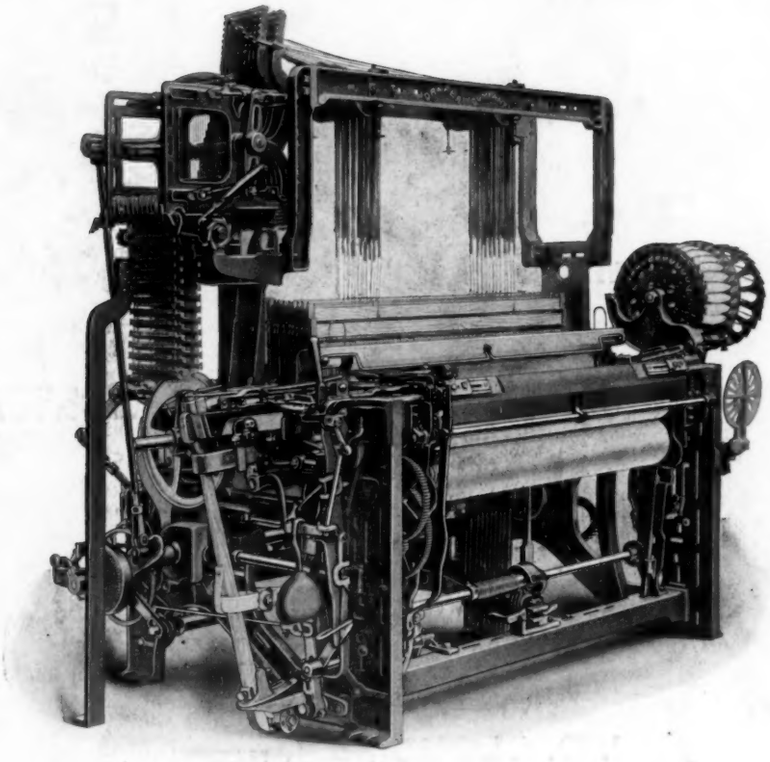

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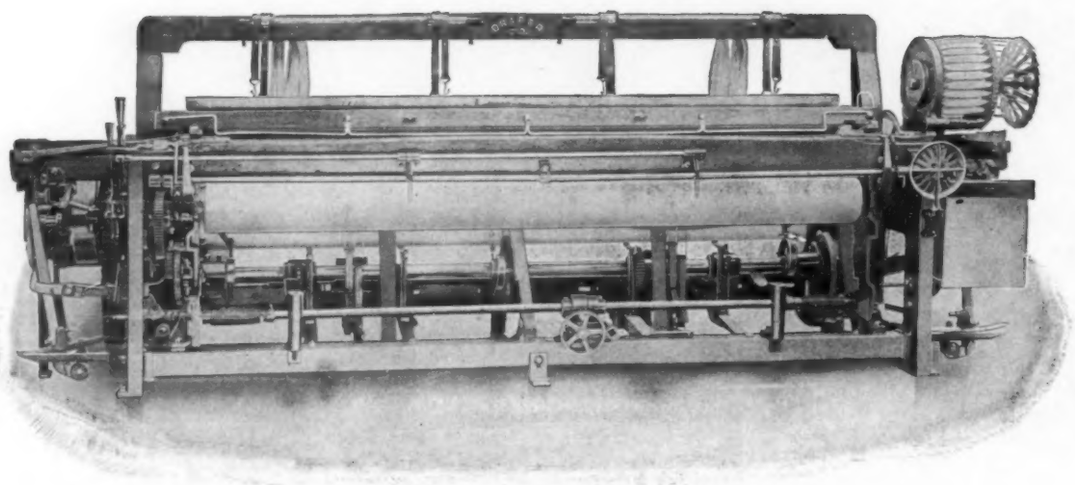
NORTHROP LOOMS



Solve the Labor Problem,

Make an Easier Job for the Weaver

AND

Earn Larger Dividends for the Mill.

DRAPER COMPANY,

HOPEDALE, MASS.

J. D. CLOUDMAN, SOUTHERN AGENT,

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WORKING FOR THE COMMON GOOD.

Two of the greatest problems that confront the mill manager today and which year after year, are becoming still greater problems, are the personal relations between the mill officials and their overseers and between the mill officials and their operatives. Many mill owners, agents, and managers are beginning to realize that betterment plans, welfare work, or whatever it may be called, is not being done from a sense of philanthropy, but because it is one of the requirements of modern up-to-date business methods. When speaking before the American Cotton Manufacturers' Association at their recent convention in Washington, Joseph Fels, the millionaire soap manufacturer of Philadelphia, told the members of the association that in his experience, he had found that higher wages produced cheaper manufacturing costs. However, wages are not all there is to life, and Southern cotton manufacturers long ago realized that there were many other features of the operatives' lives that needed careful attention and mill officials all over the South have adopted various plans for welfare work which they believed were needed by the operatives in their immediate vicinity. These plans have varied considerably in their scope, but in every instance have resulted in improved conditions in the communities where applied. In improved productivity as well as mutual, social and physical advancement.

We wish to call particular attention to the article in this issue entitled "The Help Question." This discussion of conditions by an overseer in a Northern mill will prove of great interest to every Southern cotton mill operator. As the author has requested other mens' ideas in regard to this subject of the relation of the mill management to the operative, we believe that a further and more complete discussion by men from both Northern and Southern mills and from the office, as well as from the overseer who is actively engaged in the daily handling of the operatives in the mill, will go a long way toward producing a practical solution of this problem for both sections of the country.

This correspondent has suggested that the mill build houses for the operatives and sell them these houses on the installment plan, allowing the rent to go toward payment for the house, the house itself to become the property of the operative and family as soon as paid for. A similar method to this has already been adopted by the management of the Amoskeag Mills at Manchester, N. H., and is being watched with interest by New England cotton mill managers. This same idea was carried out a good many years ago at Peacedale, R. I., by the Hazzards. This mill at Peacedale is a woolen mill, but the method of selling the operative his home on the small payment plan was adopted at that place and at the present time a number of the operatives own their own homes and have lived in the Peacedale mill village for many years.

This correspondent also illustrated a method which he is trying with one or two of his operatives. While this method has proven itself successful in one case, it must be admitted that it is rather a long and tiresome process

and must in a good many cases result in discouragement for the overseer. However, he has proven that the idea is available and if conscientiously carried out month after month among the operatives who seem to be most in need of this suggestive betterment, as indicated by the attitude of the man for whom they are working, the result in the end might be well worth the time and effort spent in attaining it.

Having now discussed the second part of our question first, we will return to the first part, or to the relation between the office manager and the overseer himself. This same correspondent has dealt briefly with this subject, and from his experience, it would seem to indicate that Northern managers are inclined to study the production figures of the mill much more attentively than they do the actual conditions within the mill itself.

Another feature of the question which is closely interrelated with the subject in hand, is also the relations between the overseers themselves when in the mill. This subject was discussed at some length by A correspondent in the February issue of COTTON, under the heading, "Teamwork in the Cotton Mill." The old motto that, "in union there is strength," was never better evidenced than when applied to the mill overseers as a body and the superintendent, general manager, agent, and other officials of the mill who are generally supposed to constitute the office end of the management. If they all pull together and work for the successful operation of the mill in all its phases, they will achieve success in its greatest measure.

What provides the best solution for these two great questions? When should social and industrial betterment begin and when should it end? Or should it be continued indefinitely? It might be added that the great things men accomplish live after them as monuments to their memory, but we are not in business to build monuments. The monument feature is only a secondary consideration. However, there are hundreds of Southern manufacturers who say that it pays to do this work to a certain extent from a business standpoint. The question is, When will the law of diminishing returns begin to apply? Where is the limit, or is there a definite limit?

CONCERNING THE TARIFF.

Is a live discussion of any current topic ever old? When the people of a whole country, individually and collectively, are discussing the question, "shall we, or shall we not, have a Protective Tariff," can that question be considered so old as to be uninteresting? A prominent professor of political economy in one of our leading universities says, "The average citizen is still unacquainted with some of the simple economic laws of trade." If that is a fact, is it not the duty of those who are familiar with such laws to so explain and individualize the theories and facts contained therein that they may be correctly interpreted by the "average citizen?" The actuating motive for these remarks is the following letter from the Hon. William J. Bryan:

L. L. ARNOLD, EDITOR COTTON,
Atlanta, Ga.

MY DEAR SIR:

I am in receipt of your letter enclosing the article on the tariff ("Benign Protection," by Fred W. Simons, in the January, 1912, issue of COTTON). I have not discovered any new argument in support of the tariff, and the subject is so old that it is not likely that any argument startlingly new will be presented, although the defenders of the system of protection have had to change base several times. They first desired a protective tariff temporarily; then they defended it on the ground that it was not a tax upon the consumer. Now they defend it as a permanent institution, and admitting—at least most of them do—that the tariff increases the price of the protected article, insist that it is justified in the interest of labor, but President Harrison's admission drawn out by the Carnegie strike and the evidence brought out at the Lawrence investigation show how fallacious are the arguments based upon the theory that you can safely make the manufacturers trustees for the employes.

If you want to present a new defense of protection, I suggest that you propose that the money intended for the employes shall be given to them directly and see how quickly the protected manufacturers will protest. The manufacturer who seeks protection has the burden of proof upon him to establish three facts, first—that the principle is right; second—that the policy is wise; and third—that the tax asked is necessary. The supreme court decision in the Topeka, Kan., case is a declaration against the principle embodied in the taxation of a part of a community for the benefit of another part.

The policy of protection is doomed by the fact that it has been the greatest corrupting force American politics has known, and the necessity for the protection asked has never been shown; that is the one subject that the protected interests studiously avoid. When you have something new to offer, either in support of the right of the few to tax the many, or in favor of the policy of turning our government over to special interests, or of the necessity for a tariff levied purposely and specifically for protection, I shall be glad to hear from you.

Very truly yours,
(Signed) W. J. BRYAN.

We are not trying to defend "protection," as Mr. Bryan's letter seems to intimate. In fact, "protection" seems to already have a much more able defender than we could ever hope to be in the author of "Benign Protection." What we did desire was to have Mr. Bryan personally refute the assertions of Mr. Simons, if he could, for the economic instruction of the "average citizen," many of whom are seeking education along these lines prior to next November. Mr. Bryan has not done this because—well, because the argument and subject is so old.

THE FARMER AND THE MANUFACTURER.

Congress appropriates over $15,000,000 annually to the maintenance of the Department of Agriculture, a large proportion of which is used in promoting agriculture. The Bureau of Manufactures, working for the commercial and industrial interests of the country is allowed an appropriation of $160,000. The yearly value of agricultural products is approximately $9,000,000,000, and the value of manufactured products over $21,000,000,000. The Bureau of Manufacturers is accomplishing wonderful results even with the present meager appropriation. If provided with sufficient funds to carry on this work in a manner proportionate to its magnitude, this Bureau has a greater possibility of affording these interests assistance of a constructive and promotive character than they receive from any other branch of the Federal Government. Urge your Congressman to increase this appropriation.

IS PROTECTION BENIGN?

It is Expensive to the Laborer — It is Expensive to the Capitalist — Can the Cost be Justified—The Average Citizen still Unacquainted with some of the Simple Economic Laws of Trade.

(*Contributed Exclusively to* COTTON)

BY WILLFORD I. KING, PROFESSOR OF POLITICAL ECONOMY AT THE UNIVERSITY OF WISCONSIN.

In the January number of COTTON, Fred W. Simons presented an introductory brief for protection—a brief in which he advanced the usual arguments for a protective policy and supported his contentions by some well-chosen illustrations. While I do not believe in any "natural right to freedom of trade" or, on the contrary, in any "patriotic duty to protect our home industries," I do feel that, in the discussion of the tariff question, many of the primary fundamental principles therein involved have too often been ignorantly or wilfully obscured by large masses of specious, intricate, and roundabout reasoning with the result that the average citizen is still unacquainted with some of the simple economic laws of trade worked out clearly by the great economists of the eighteenth century. My only endeavor will be to present a few of these fundamental, generally-accepted propositions in such a form as to be intelligible to the man who is not versed in the terminology of political economy. In presenting this discussion, I shall build upon the foundations already laid by Mr. Simons—taking up and discussing his arguments one by one.

WILLFORD I. KING.

Mr. Simons introduces his subject by a perfectly definite proposition to which all fair-minded persons must assent and which must be continually kept in mind throughout the whole discussion. This proposition is, "There can be only one valid reason, one justifying plea, for the imposition of a protective tariff. That reason—that plea—must be the substantiated assertion that a protective policy will work for the betterment of the condition of the great majority of the people of the country. Moreover, even that plea will fail, for moral reasons, if it can be shown that, by adopting a protective policy, this country will work injury to the world at large."

With this standard in mind we shall test the soundness of Mr. Simons' first and principal argument—the argument that protection benefits the American laborer. Labor leaders have often sneered at the solicitude of the manufacturers for the downtrodden laboring man, but doubtless this solicitude is as often real as assumed. If protection keeps up wages as a whole, this is certainly a most laudable motive for continuing the policy. If more protection means higher wages in general, by all means let us have more protection. The fact that American manufacturers originally asked Congress for protection because of the exorbitant wages required by the American laborers and later asserted that these high wages were the result of a protective policy, may appear to most readers a slight inconsistency in the development of this line of argument, but this, of course, does not really invalidate the proposition but only casts an omnious shadow thereupon. The fact that the workers in the highly protected textile industry receive far lower wages than those employed in an unprotected industry like transportation might again arouse adverse criticism concerning the logic of the theory, but even this fact affords no safe criterion for forming a careful judgment. Before we can really talk intelligently of the relation between protection and wages, we need to thoroughly understand the law by which wages are determined. Since some readers may be unfamiliar with this law, I shall try and state it briefly in this place.

The price of labor, like the price of other commodities, is fixed by the inter-action of supply and demand. Supply and demand are, however, terms used to denote two opposing forces, each of which is made up of various components. It is necessary, therefore, to analyze the more important of these components.

Labor is demanded because labor is productive. If a man works for himself he produces commodities which he may use or exchange. If he works for another man he produces commodities for his employer.

In a competitive state of society the wage of a laborer is approximately equal to the value which he adds to the total product of the plant in which he works. It must be understood that the laborer does not receive the share of the product due as interest on the capital invested in the plant, nor the share due as rent to the owner of the land upon which the plant stands. Neither can he lay claim to the wages of management earned by his employer, nor to the chance gains obtained by the employer through fortunate speculation, or shrewd foresight. The laborer gets only

the value that he himself produces. If his wages exceed the value of his product, the employer must either lower the wages, discharge the employee, or be gradually forced into bankruptcy. If the workingman is paid less than the value which he is capable of producing, other enterprising employers will see the chance for a net gain, outbid his present employer and so raise the wages to approximately that part of the value of the product due to the laborer's exertions. Of course it is not true that every workingman has his wages accurately adjusted according to this standard, but the general rate of wages in a given trade depends strictly upon productivity. Whatever makes laborers in any branch of industry more productive of value adds to the wages in that industry, and whatever reduces the value of their output likewise lowers their wages.

But it was stated that wages depend on supply and demand. Where does supply come in? The supply of laborers is a very important factor in regulating the average output per laborer. If laborers are few, the amount of capital and natural resources available for the use of each laborer will be large; that is, each laborer will have better tools and machinery with which to work, better food and shelter and more of land and the products of nature at his disposal. This being the case, he can and will turn out a larger product and hence his wages will be high. If the supply of laborers is large, the reverse, of course, is true.

But, what governs the supply of labor? Supply is affected by many causes, such as customs and laws regarding the labor of women and children, the usual hours of labor, the industry of the people, etc., but the two important and controlling factors are immigration and the standard of living. If there are nearby countries with a large supply of cheap labor which can come in with few restrictions, then it is extremely difficult for any nation to maintain high wages. The immigrant is always ready to take any work which he can do at what seems to him a munificent price per day, although it may be much less than has been hitherto paid for the same amount of labor. Labor always competes, to some extent, with all other labor of the same grade, but the severity of this competition may be mitigated by the general unwillingness of laborers to seek their fortunes in strange lands.

If immigration is not a factor in the labor supply, then the controlling feature is the standard of life of the laborers. The laborer with high standards to maintain cannot afford to and will not rear a large family. Hence, the number of laborers in that walk of life is limited to the number which may be supported in accordance with existing standards, capital and land are proportionally abundant, labor is productive, and wages remain high.

If the protective tariff gives higher wages, it can only be through limiting the supply of labor or increasing the average value of the product per man. No pretense is made by anyone that it affects supply. Does it affect the value of the product, and, if so, how?

The value of the average product per laborer might be increased either by an increase in the quantity of goods produced or by an increase in the value of the goods per unit. Since value is a ratio of exchange, it is evidently impossible to increase all values at once. If one unit of commodity A exchanges for more units of commodity B than formerly, evidently one unit of commodity B will purchase less than before of commodity A. We must be careful, then, in this connection, not to confuse value with price. Price is value expressed in money. Money may go up or down in respect to commodities, thus causing a general fluctuation in prices, but a general fluctuation in values *in one direction* is impossible and it is values and not prices that we are discussing in this paper.

Since protection cannot cause a general rise in values, it can only affect the productivity of the workingman as regards the *amount* of goods which he can produce. This, then, is the point at which protection really touches upon wages and to this point we must give careful consideration. Under a system of free competition, capital and labor naturally flow to the most productive fields. If one man discovers some new form of investment which is extraordinarily profitable, others soon experiment in the same line and this is kept up until profits in the new industry are reduced to the usual rate. Similarly, if wages are unusually high in some given trade or occupation, laborers shift to this line of employment either directly or through training their children for this branch of industry. Hence, for a given average amount of toil and risk requiring a given standard of skill and capability in the workman and a given amount of education or apprenticeship for its mastery, the real wage—that is the amount of commodities paid for an hour's labor—tends to become uniform throughout the country and throughout different varieties of employment of this particular grade. Therefore, capital and labor tend to shift constantly to those fields which are most profitable; which give the greatest amount of return for a fixed expenditure of energy. Every country has some qualities which adapt it for special lines of production, hence it naturally tends to specialize in the production of these articles. Specialization leads to division of labor and exchange of products.

The Dakota farmer grows wheat and exchanges it for the cotton of Texas. The Pennsylvania miner digs coal which is exchanged for the pork of Iowa and the sugar of Cuba. The natural tendency is for the corn grower of Illinois to trade his corn for the woolen goods of Great Britain, but now he finds an artificial barrier, called protection, hindering this transfer, which would be so beneficial to both. The protectionist says, "Let America grow what Americans consume." Carry this argument to its logical conclusion and the Canadian farmer would be required to grow his own pine apples and the Cuban planter his own wheat. If tariff walls between nations are beneficial, certainly they would be beneficial between states, between counties, between townships, and, indeed, between individual farms. From the logical view-point of the thorough-going protectionist, trade is not, as is generally supposed, a chance for mutual gain, but a thing to be repressed and crushed.

Of course, the protectionist never carries his argument to the logical conclusion, but, insofar as a tariff is actually protective, it hinders trade, and, in so far as it hinders trade, it drives capital and labor from more productive to less productive fields; it lessens the net product of the laborers of both countries separated by the tariff wall, and hence lowers the average real wage of the workingmen in both lands.

It is true that protection may gain a temporary advantage for the laborers in one industry over those in other industries. It is even more likely to gain temporary net profits for the employers in that one given industry. If the employers have a monopoly within the protected coun

try, this advantage may be permanently maintained. If not, competition will, within a few years, force both profits and wages back to the general level.

We have dealt with conditions under which free competion has been the rule. When monopoly takes the place of competition, the laborer may lose even the temporary advantage accorded by protection to the favored industry. A monopoly pays no higher wages than can be obtained in similar competitive industries for the same grade of labor. Why should it? It isn't good business.

To sum up, then, "labor competes with labor and goods with goods, but labor never competes with goods." The way to raise wages is either to lessen the supply of labor or to increase its productiveness. Prohibit immigration and wages will rise, levy a protective tariff and real wages fall. The laborer may, in the latter case, be sometimes deceived by an increase in his money wage, but that apparent benefit becomes a mockery when he finds that his cost of living has been raised even more.

We are told that experience disproves our theory. We are asked to compare the high wages of protective America with the low wages of free trade England. Why not compare the wages of England with the still lower wages of protected Germany, of high tariff Italy or Japan? "It's a poor rule that won't work both ways."

It is not contended that protection is never justifiable, but it is maintained that it is a burden to all nations whose trade is hampered by the tariff wall. It is expensive to the laborer, expensive to the capitalist,—can the cost be justified?

Mr. Simons says "This country ought to have such protection as will entirely eliminate foreign competition upon all merchandise that can be produced here with as little expenditure of human effort as is required to produce it anywhere else." In such instances, little protection will be needed. There is no danger that we will freely devote our efforts to producing things to which our resources are ill adapted, unless forced by law into such undertakings. We will not trade unless we hope to gain by the exchange. No prohibition is necessary in such cases!

Evidently, then, we cannot plead for protection on the ground of benefiting American labor; we cannot ask for it in order to prevent trade which will never take place or be mutually unprofitable. I will leave further arguments for "Benign Protection" to be advanced by its admirers.

BETTER METHODS IN COTTON HANDLING

BY MAJOR JOHN M. CARSON OF THE BUREAU OF MANUFACTURES.

American cotton is the worst packed cotton in the world. It is estimated that as a result of bad packing there is a loss of four pounds of cotton to the bale, which, on an average crop of 12,000,000 bales would be 48,000,000 pounds that are lost annually.

It is believed by many that a plan might be evolved which would result in a uniform package and uniform grading of cotton that would be satisfactory to the mill men and profitable to the grower. It has been suggested that the federal government should take up the matter and establish a system for inspecting, grading and marking cotton that would obviate the numerous inspections now in vogue, and give every bale of cotton character and currency in every market of the world.

In conferring with men actively engaged in the several branches of the cotton industry, from its cultivation to its conversion into yarn and fabrics, I find some who think the adoption of a uniform system of packing, preparation and grading is impracticable, while many others believe it may be successfully and satisfactorily done. All agree that such a system is desirable, a fact which is in itself encouraging. I am convinced that if the people of the cotton-growing states will seriously take up the question that confronts them, and with a singleness of purpose determine to work a remedy, they will succeed.

D. A. Tompkins, of Charlotte, N. C., a large manufacturer and a man who has given much thought to the general subject, has worked out a plan which he believes would meet all requirements. His proposition substantially is that the cotton should be graded and inspected at the gin or warehouse and a certificate given to the owner which would give the weight of the bale and the classification of the cotton, showing grade, tinge, length, softness, fineness and strength of the staple. This information could be marked on the certificate and the bale delivered to a warehouse and held subject to the surrender of the certificate.

Mr. Tompkins pointed out that this method would enable the grower to market his cotton without the trouble and delay incidental to the present system; and, instead of huckstering the product about the local market and forced to make a sale at a price which might be ruinous, he could pocket his certificate and hold the cotton until the return of normal conditions. Furthermore, the certificate would be negotiable, enabling the farmer to use it as collateral in borrowing money from the local banks to meet his present emergencies. This plan makes the warehouse the custodian of the cotton and places upon it full responsibility for its safety and integrity.

Many with whom conference was had believe that if the federal government would become the practical custodian of cotton after leaving the gin the proposed system would be perfected. It was suggested that the federal government establish a system for inspection and grading, governmental action being optional with owners of cotton. This would leave the merchant and mill owner free to deal with the farmer and would not deprive the latter of the right to dispose of his product in any manner deemed desirable. On the other hand, consumers at home or abroad would be enabled to purchase cotton of the quality desired, stipulating that it should have governmental inspection and certification.

This suggested system does not contemplate that the federal government shall go into the warehouse business. On the contrary, the functions of the government would be confined to inspection, grading and certification. It is believed that such a system would lead to the erection of warehouses by private enterprises ample to care for the cotton and safeguard it against vicissitudes of the weather. It will require much time and intelligent effort to work out a plan of inspection and certification, but the necessities of the trade require some move that shall be speedily made in that direction. This is plainly apparent to every man engaged in the great cotton industry and is accentuated by the spectacle presented at every large cotton market in the United States of thousands of bales of this most valuable staple loosely thrown together, inadequately protected by flimsy, ragged so-called covering and exposed for long periods to the vicissitudes of the weather with resultant deterioration and loss.

National Association of Cotton Manufacturers.

The ninety-second annual meeting of the National Association of Cotton Manufacturers was held in Paul Revere Hall, Mechanics Building, Boston, Mass., on April 24th and 25th, at the same time as and in connection with the third textile exposition, which was given under the auspices of the Textile Exhibitors' Association. The attendance was large and the varied and interesting program excited much favorable comment. The textile exposition being in the same building afforded a convenient and instructive means of entertainment for the members between sessions.

The Program.

First session on Wednesday, April 24, was at 11 a. m. Report of Secretary, Treasurer and Auditor. Award of association medal. Welcome to the city by John F. Fitzgerald, mayor of Boston. Response to the mayor's address by William A. Erwin, president Erwin Cotton Mills, West Durham, N. C. President's address by Franklin W. Hobbs, treasurer Arlington Mills, Brookline, Mass.; Banking Problems in Cotton Manufacture, by the Hon. L. P. Padgett, M. C., Columbia, Tenn.

Second Session, Wednesday, April 24, at 2:30 p. m. Cotton Growing in Egypt, by Arno Schmidt, secretary International Federation of Master Cotton Spinners and Manufacturers, Manchester, England. On the Buying of Labor, by Jonathan T. Lincoln, Fall River, Mass. Cost Records, by Charles M. Sears, Brookline, Mass. The Interpretation of Water Rights in Connection with Water Power, by Richard A. Hale, C. E., Assistant Engineer, Essex Company, Lawrence, Mass.

Third Session, Thursday, April 25, at 10:30 a. m. Decca Muslins, by E. N. Murti, Cotton Manufacturer, Madras, India. Equipment and Testing for Uniform Sizing, by Leonard W. Cronkhite, treasurer Industrial Starch Co., Boston, Mass. Standards of Cotton Yarn, by A. T. Bradlee, of William Whitman & Co., Boston, Mass. History of Cotton Classification by Prof. R. J. H. DeLoach, A.M., Professor of Cotton Industry, State College of Agriculture, University of Georgia, Athens, Ga. An Electric Conditioning Oven, by Henry W. Buhler, Boston, Mass.

Fourth Session, Thursday, April 25, at 2:30 p. m. Steam Plant Efficiency in Textile Mills, by R. L. Foster, Engineer, Fitchburg Yarn Co., Fitchburg, Mass. Transmission of Power by Ropes, by Edwin Kenyon, Chapel Field Works, Dukinfield-near-Manchester, England. Ballot on New Members. A Saw-Tooth Roof Weave Shed by Albert Greene Duncan, treasurer Harmony Mills and Chicopee Mfg. Co., Boston, Mass. Election of Officers. The Franklin Dyeing System by John C. Hebden, Franklin Process Co., Providence, R. I.

The President's Address.

The past year has been a most unsatisfactory one for those engaged in our industry. Few mills earned dividends; most mills which paid dividends took them from surplus accumulations of other years and many mills were compelled to pass dividends entirely. Extensive curtailment was the rule, but many mills were run at a loss in order to keep operatives employed and organizations together. The results of the year 1911 throw a strong light on the condition of the industry and give a most effective answer to ignorant or malicious talk about the enormous profits of the business. I am happy to be able to add, however, that it now looks as if the long period of depression which we have just suffered is at an end and the outlook for the immediate future, at any rate, is encouraging. Unfortunately, we have ahead of us uncertainty in connection with tariff legislation and the upset of business which is inevitable in a presidential election year, and no one can predict the effect these two disturbing factors will have on our industry and on the business of the country as a whole. Let us hope, however, that the improvement which has begun, may continue and increase until once again every spindle and every loom is running, and that as a result, stockholders and operatives may enjoy a period of contentment and prosperity.

WORLD'S ACTIVE COTTON SPINDLES AND MILL CONSUMPTION OF RAW COTTON, 1911.

COUNTRY—UNITED STATES.	Active Spindles.	Mill Cons. Bales.
Cotton growing states	11,077,000	2,328,000
All other states	18,438,000	2,377,000
	29,515,000	4,705,000
COUNTRY—EUROPE.		
United Kingdom	54,523,000	3,782,000
Germany	10,480,000	1,685,000
Russia	8,672,000	1,625,000
France	7,300,000	960,000
Austria-Hungary	4,564,000	749,000
Italy	4,282,000	790,000
Spain	1,853,000	315,000
Switzerland	1,481,000	100,000
Belgium	1,327,000	217,000
Portugal	476,000	65,000
Netherlands	431,000	79,000
Sweden	528,000	95,000
Denmark	80,000	21,000
Norway	74,000	11,000
Other European countries	200,000	60,000
British India	6,250,000	1,650,000
Japan	2,180,000	1,060,000
China	831,000	350,000
Brazil	1,000,000	370,000
Canada	855,000	119,000
Mexico	630,000	140,000
All other countries	260,000	65,000
Total	137,792,000	19,013,000

From the above it will be seen that the number of active cotton spindles in the world was 137,792,000; an increase since 1900 of 32,111,000 spindles, or 30 per cent. In addition to the above there were 1,281,000 spindles in the United States that were not running during 1911, and it is estimated that the number of inactive spindles in the world was 3,000,000, which would make the total spinning spindles in all countries about 141,000,000.

It will also be seen from the above that the mill consumption of cotton for the year ending August 31,

1911, was 19,013,000 bales, as compared with 18,321,000 in 1910, and 19,397,000 bales in 1909. These figures, however, do not include the actual total consumption of cotton, for in some countries large quantities are grown and consumed without entering the world's markets, and definite figures cannot be obtained for these amounts. It is estimated, however, that the total consumption of cotton during the year ending August 31, 1911, was 300,000 bales more than the production of cotton from the crop of 1910. During the past year, however, the mills were not running full and in 1909 when the production was more nearly normal the consumption was 384,000 bales greater. Taking into account the total number of spindles now in the mills of the world, it is estimated that if they were all running full time the consumption of cotton would be practically 21,000,000 bales. The United States supplies about two-thirds of the world's consumption of cotton and in general the world's consumption varies with our production. It would seem reasonable to believe, therefore, if conditions are anywhere near normal, that an American crop of from 15,000,000 to 15,500,000 will be consumed in the mills during the year ending August 31, 1912.

Furthermore, assuming all the spindles of the world were run at maximum production for one year, I repeat my query of a year ago: "Where will the additional amount of cotton needed for the world and its increasing population come from?" I cannot too strongly impress upon our people the necessity of studying and solving this great problem in order that we, as a nation, may maintain in the future our unquestioned supremacy in the raw cotton production of the world.

Through the agency and active work of Hon. William G. Brantley of Georgia, Secretary Knox has caused a thorough investigation is to be made by the United States Consuls as to practice with reference to "Tare" in foreign markets. Mr. Knox reported:

"It is apparent that the net returns obtained by American cotton growers under existing methods employed in baling are less than they would be were the cotton better prepared for market. . . .

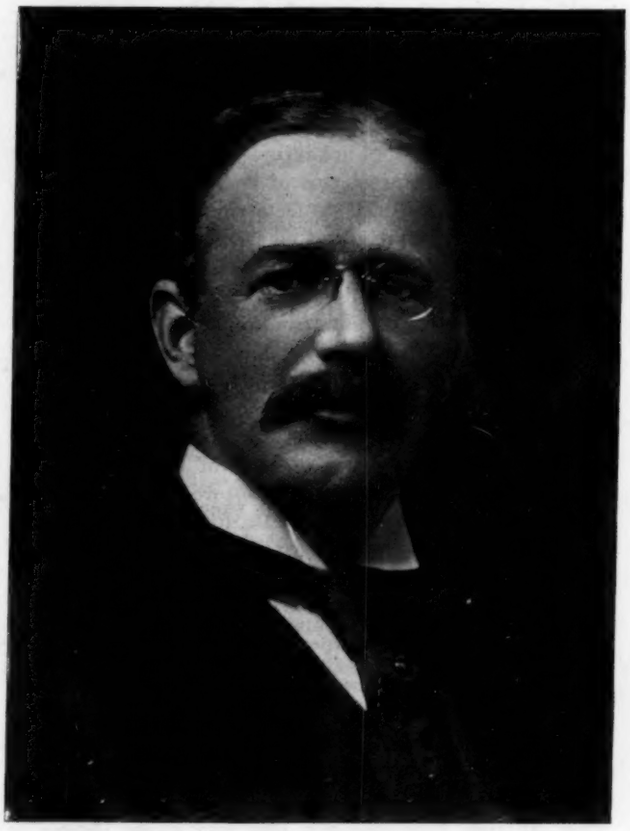
"I had the honor to suggest the advisability of legislation identical on the part of all the states interested in the production of cotton to the end that uniform methods might prevail in the preparation of cotton for shipment whereby the weight in kinds of bands and coverings would be standardized throughout the South. The result of the present investigation appears to me convincing that concerted action on the part of the cotton states providing such legal standards for the 'tare' of cotton would remove the cause of the loss now borne in the marketing.

"The producers of other nations, now supplying nearly 40 per cent. of the cotton imports required by the world's great consuming markets, have so standardized and perfected their methods of baling that the ultimate buyer is content with such an allowance from the gross weight of the bale as is represented by the actual weight of the iron bands and the covering. The arbitrary charge for 'tare' against cotton of American production apparently can be overcome only when the American bale is standardized. When this is accomplished there will exist no incentive for an excess allowance, since it appears that foreign buyers are willing to buy on the terms of actual 'tare' when this can be arrived at readily with a reasonable certainty."

The Department of State has made a comprehensive report on the whole subject of tare and the various kinds of coverings used. It is indeed humiliating to Americans to be informed by their own government that the cotton producers of other nations handle the product better than those engaged in the same business here, and it is to be hoped that in the near future, positive action will be taken by the growers along the lines suggested.

There has been so much talk of late about the unhealthful conditions under which the textile industry is carried on that it seems well to state a few facts and thus contradict the misstatements that have been made in the attempt to prejudice the public against our business. We find contented, happy, well-paid people working in large, clean, well-lighted, well-ventilated rooms, amid healthful surroundings, far better in every way than their homes and the healthiest places they are ever in.

The laws of Massachusetts require in the public schools 300 cubic feet of air space per pupil and 30 cubic feet of fresh air per minute per pupil. In a spinning mill in Lawrence, Mass., there are actually 3,000 cubic feet of air space per operative in the mill and the ventilating system furnishes 50 cubic feet of fresh air per minute per operative



PRESIDENT FRANKLIN W. HOBBS.

—air which is cooled in summer and warmed in winter. You will note that the operatives are furnished ten times the air space and nearly twice the amount of fresh air per minute which is required by the law for the school children of the state. One of the state medical inspectors who has made a great study of hygiene and health conditions among all classes of people, recently told me he would state without hesitation and with knowledge gained by actual investigation, that the hygienic conditions in many Massachusetts mills are better than those in any schoolhouse in the state. These are facts but, unfortunately, many well-meaning people, utterly ignorant of the facts, have proclaimed so loudly, in season and out of season, that a textile mill was not a fit place for men and women to work in, that the public has begun to believe it is so. If our philanthropic friends would take the time and trouble necessary to get at the facts, I am sure they would agree

with me that the legislators would better turn their attention for a time to the conditions existing in the homes of the operatives and attempt to bring them up to the high standard already found in the mills.

Let us consider the following facts: The modern factory has abolished the sweat shop; the regular life and hours have, of necessity, lessened dissipation; there can be no over-crowding from the very nature of the machinery; labor laws have greatly reduced the hours of work; all sorts of devices lessen hard labor; each new machine not only lessens labor, but enables men to earn their livings in less time; it was the necessity of our mills that first made possible the development of humidification and cooling of air which now gives comfort to the afflicted in our hospitals; the incandescent electric lamp was also a development caused by the demand of the mills for a light which would not vitiate the air and which could be placed where needed; libraries, rest-rooms, lunch rooms and Y. M. C. A. rooms are found everywhere; a higher standard of living exists; the best sanitary and hygienic conditions known are found in the mills. It will be seen, therefore, that the modern factory life does not injure mentally, morally and physically those who are a part of it, but that the contrary is true, and that the modern factory system has been instrumental in lifting the life of the people to a higher plane.

It is needless for me to tell you that every cotton manufacturer is being constantly importuned by those claiming to be able to obtain for him extraordinary results in manufacturing through the use of what is known as "Scientific Efficiency Management." Their claims call to mind those words of Hamlet's mother where she cried out: "Methinks the lady doth protest too much." While I do not question the value of the application of some of the principles of so-called scientific management, I approve most fully of the remarks made to us a year ago by Dr. Richard C. Maclaurin, the president of the Massachusetts Institute of Technology, who said:

"I apologize for the phrase 'scientific management,' because it has been much abused of late. For generations, much has been achieved by the application of scientific principles to the practical problems of management, and it is a distinctly encouraging sign of the times that there is a general awakening to the necessity of applying such principles to every branch of practical affairs. Unfortunately, however, a great cause is in some danger of being damaged by the indiscretions of its advocates, and the exaggerated claims that are made in some quarters can scarcely make a good impression on sound business men. It may well be questioned whether any great results can come from asking a man who knows nothing of your business how you should manage it. If you really want scientific management, it would seem to be a far more fruitful procedure to take a young man who has been educated in the scientific habit of thought, and after he has had the experience of years in facing the problems of your business, to seek his views as to methods of management."

I am afraid that, as a result of these indiscriminate claims and statements of inefficiency, the idea has gone broadcast that the great industries of the country are in a bad way and that mismanagement and inefficiency are the rule. We know that such is not the case, and I believe that the manufacture of cotton is carried on in a remarkably efficient and scientific manner, more so than almost any other industry in our country. We fully understand that there is always chance for improvement, and will at all times welcome suggestions and ideas that will still further advance the real efficiency of our industry. We have, however, long appreciated and felt the need of the highest grade of skill and the most watchful care in the management of our business, and I am certain that every up-to-date concern engaged in the manufacture of cotton has for years studied and applied the basic principles of this much heralded cure-all, which it is now claimed will revolutionize all business.

We must, of course, in all things keep abreast of the times, keep our labor and machinery at a maximum production and efficiency and thus keep down our cost and improve our product. It is no disparagement, however, to the skill needed in every process in the actual manufacture to state that such skill is only a portion of what is essential to make the business profitable. The human, personal element must be considered and that, it seems to me, is not sufficiently taken into account by the efficiency engineers. We may find one company with all the efficiency systems known but, if it lacks the personal element, which is absolutely essential to success, the enterprise will fail. The manufacturing process may be carried on with the greatest skill and efficiency, the labor cost may be the lowest and the product the best, but unless the raw materials are purchased on the right basis and at the right time and the product sold and distributed in the best possible manner, no business can be successful.

Furthermore, no business can succeed today without co-operation and loyalty in every branch. All must work for the common end and rise or fall together. That is the spirit of the times and the real secret of success. "Esprit de corps" or "team work" is essential. A happy, contented, loyal body of work people is necessary for success. The executive is responsible for that and to secure results must select, with great care, all his assistants, each especially fitted for a certain place, and then he must inspire them with his own energy, loyalty and enthusiasm and the same spirit must pass on down to the humblest employee. Without such an organization no modern business can succeed. In other words, it is the human, constructive, planning, guiding, and inspiring mind upon which, after all, success or failure depends, and, it seems clear to me, that sort of ability or genius is "born, not made," and beyond the realms of "scientific efficiency management."

THE WAVE OF RADICALISM.

We may well pause a moment to consider some phases of the way in which Radicalism has swept over the country, in fact, I may say over the world, for it does not seem limited to any country or any people. In our own country there has been so much talk and so much denunciation of the established order of things that one naturally begins to wonder if, after all, this nation and its form of government are failures. So much has been said about the "Rule of the People" that we are almost led to believe that our rights have been taken from us. It is claimed that we need new laws, new methods and a general over-turning of old customs. It seems to me, however, that we do not need new laws or more laws, we do not need new methods or quicker method of making laws but that we do need a greater respect for the laws already existing and a firmer belief in law and order itself. Justice Story, one of our great jurists, said, "Ours is emphatically a government of laws, not of men." That doctrine was sound when he enunciated it, it is sound today, and it will be sound always.

It is now claimed by some that "the people" can never do wrong and that their opinion, often expressed under stress of excitement or swayed by the misrepresentations of demagogues, shall prevail regardless of law and that if the courts decide that such expression is illegal so much the

worse for the courts, for it is now proposed to make the decisions of the courts themselves amenable to popular clamor. If such things come to pass of what value are the principles of justice embodied in our common laws for the protection of all and why have a written constitution sacredly agreed to by the representatives of all the people in order to safeguard the rights of the minority as well as the rights of those temporarily in a majority?

It seems clear to me that as a result of this talk, criticism and denunciation on the part of the politicians and demagogues there has followed quite naturally a growth of socialistic ideas and Socialism throughout the country. The agitators have sown discontent and dissatisfaction and the country is reaping Socialism and Anarchism. I know of no better statement of this phase of the matter than that of President Hamilton of Tufts College, who recently said:

"I have said, and I repeat, that there are a good many theoretical Socialists who are very good, very well-meaning, very honorable citizens. There are a good many persons who, because they are dissatisfied with existing conditions in their community, are ready as an experiment to vote for a socialist administration. But, gentlemen, let us face this situation frankly and see what we see. The socialism that demonstrates in the streets of our big cities, the socialism that takes occasion to turn an industrial dispute into a riot, the socialism that loses no opportunity to inflict a wound upon the peace of the community, the socialism that waves red flags and prints incendiary literature, is crime. We may just as well face that fact now as have it forced upon us by the disasters of a future which we will have made only the more disastrous because we have tampered with it. Behind the gaudily painted visage of socialism, with its promise of a golden age, are the snaky locks and the gory fangs of crime, nothing more nor less, and the sooner we recognize that fact and deal with the question upon that basis, the sooner we shall have put ourselves in a way to safeguard for the future those liberties of the individual which our ancestors fought, bled and died to secure one hundred and twenty-five years ago."

Gentlemen, that is strong, forceful language, but it is true, and as manufacturers and public-spirited citizens, I believe it our duty to take heed and to do our part to lead the people back to their old moorings and to see that confidence is restored in the old leaders. When that has been done we shall have industrial and political peace, and prosperity will be with us as before.

I am afraid that a certain failing in human nature makes one feel that "the times are out of joint," having in mind always by "the times" those in which one lives.

The following extract from a letter describing conditions in London, the high cost of living, extravagance of expenditure, and consequent discontent and labor upheavals, may interest you:

"An amazing luxury and dissipation, added to the vast wealth of individuals, and the extreme dearness and scarcity of many of the necessaries of life have, as it were, reduced the value of money, while custom (that tyrant to whom all must in some degree submit) has rendered it necessary for a man to spend a great deal of it, who would live with decency or make any tolerable appearance amongst his fellow mortals. And so rapid is the progress of luxury and the increase of the rate of living, that an American gentleman who was here five or six years ago, and returned again last fall, tells me he finds that the expense of living is at least one-third higher now than when he was here before.

"The seamen, the coal-heavers, the watermen, the journeyman hatters, sawyers, and weavers are up in large bodies, all complaining of the high price of provisions, etc., and demanding an increase of wages.

"On Wednesday, the seamen to the number of about eight thousand went down to Westminster with great regularity and without committing any outrages, presented a petition to Parliament, requesting an act for regulating their wages, etc. By this rising of the seamen the maritime trade of London has been totally stopped, and no ship permitted to go down the river for several days. Some concessions have been made to them and to the coal-heavers in respect to wages, in consequence of which some have gone to work again; but in general they are not satisfied."

The above has a very familiar tone, but it was not written in April, 1912. It was actually written in London in April, 1768, by William Samuel Johnson, one of the leading lawyers in the Colony of Connecticut. It seems from the above that extravagance, high cost of living, and labor troubles were the common cry one hundred and fifty years ago as they are today. The reformers of today, who have so many new cures for old troubles, would better study the history of other times for they will find them not unlike our own. We may well exclaim as did the prophet of old: "There is no new thing under the sun!" I think also we may take new courage and new strength with which to carry on our tasks, with full confidence that they will be solved in due time, as the tasks of others have been in the past.

Steam Plant Efficiency in Textile Mills.

BY RAYMOND L. FOSTER, ENGINEER, FITCHBURG YARN CO., FITCHBURG, MASS.
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During the business hours and days of the year you represent the management, and I the engineers of textile mills. I am going to ask you to forget this for the time being, and for the benefit of the stockholders, and our own reputation seek means to obtain the best efficiency in the steam plant. The four main points upon which efficiency depends are, harmony, first cost, installation, and operation. The first, harmony, is vital. No great enterprise will succeed without it. The word "harmony," as I will use it, means, "the meeting on the level" of the three men responsible for the efficiency of the plant, manufacturer, consulting engineer, and engineer in charge. Together, they will succeed. When one holds aloof from the others there is failure. One can tie the others hands.

The consulting engineer is not always to blame for the poor efficiency of the plant. His well planned designs are often made faulty by the manufacturer's "hobbies." Neither is he responsible for poor operation.

This is true with the engineer in charge. He is not to blame for lack of efficiency, if the manufacturer has put in his hobbies, and the consulting engineer his unsuccessful experiments. Neither can he be expected to get the results from a well designed plant if the manufacturer ties his hands.

Let me illustrate: The agent of a certain mill I could name, is the whole thing, agent, consulting engineer, and operating engineer. This mill has had all kinds of accidents, boiler explosion, flywheel explosion, cylinder heads go out; in fact the engine builders keep cylinder heads on hand for this mill.

Four years ago they installed a new engine and condenser. The agent was the consulting engineer. With 150 pounds pressure at the boilers they realized 125 pounds at the throttle. The vacuum at the condenser was 27 inches, and at the low pressure cylinder 20 inches. The exhaust nozzle of the engine was 22 inches and by using old pipe which he could not afford to waste, reduced the size to 16 inches. Another mill in the same town with a larger steam plant has never had an accident. It is in the best of condition and in efficiency is equal to any. This plant is the pride of the agent, although he does not run it. He has

confidence in his engineer, and there is harmony in all their dealings.

Severe competition among mill engineers, probably caused by manufacturers calling for lower cost per spindle, has in many cases been the cause of poor efficiency in the steam plant. Boilers, chimney, engine and the buildings we must have.

The auxiliaries that are necessary for economy, and to utilize our by-products, we should have, but don't always get. In some plants we get them and they are too small or of an inferior grade. Forty-five dollars per horse power has been set by many mill engineers as a fair price for a modern, economical power plant in textile mills, using from 1,500 to 2,000 horse power. It can be built for $42.

I can cite you a mill in Massachusetts of 1,800 horse power, its power plant costing $70,000, or $40 a horse power, which is running at a cost of $16.68 a horsepower per year. To do this the money must be judiciously spent, every cent put into quality. You cannot have tile brick walls and frescoed ceilings, neither can you spread your plant over an acre of land. We have a mill in Massachusettschusetts, put up within the last five years, that has tile brick walls, polished floors, overhead electric cranes, and brass bands on all pipe covering, that are kept polished. They even went so far as to put gold leaf on the smoke boxes of their boilers. Their entire plant was built on these lines. You cannot duplicate this plant for $42 per horse power.

Luxuries do not pay dividends or improve the efficiency of the plant, but do increase the fixed charges. A mill of this style will say you cannot do a horse power on $16.68 with an 1,800 horse power plant.

We are now at the most critical stage of our subject: what to install and how to install it. There have been many city hospitals built where physicians can experiment, but as yet the only hospital our mill engineers have had is the practical plant at the expense of the stockholders and patience of the management. Many a good slice of the dividend has been spent in ripping out and building over after the plant has started.

Let us start and build a modern steam plant of 2,000 horse power and avoid these changes. Begin right by placing our engineer, who is to have charge of the plant when finished, on the ground at the start. He makes the best inspector, as it will be up to him to run it and get results later. We must bear these points in mind, for they mean the success of the plant:

First, get all the possible B. T. U. from the coal into the steam.

Second, put the pressure or heat units in the steam at the boiler into the engine.

Third, avoid all unnecessary by-products and utilize all necessary by-products possible.

Fourth, this plant complete must not cost over $84,000.

In selecting the type of boilers, we must have one that will stand a safe working pressure of 200 pounds per square inch, the weakest part not exposed to the fire; one that will have the least loss by radiation, one that will have no brick work to keep in repair, and a boiler that will take the least floor space, also one that will give us dry and superheated steam. We want a boiler so designed that by good circulation and proper ratio of grate surface to water heating surface, not less than 1/50 or 1 to 50, we may evaporate 30 pounds of water with 10 square feet of heating surface under normal conditions and natural draft.

The next step is, how many boilers do we need? Shall we put in a spare one? No man will put his money in a national bank and not use it; neither will we put our money in a spare boiler to lay idle. A modern cross compound engine of 2,000 horsepower will run on 12.5 pounds of water. One half a pound added for auxiliaries equals 26,000 pounds per hour to be evaporated. We agree that three pounds of water per square foot of heating surface is most efficient, and with this allotment of work to heating surface it is possible to get 33 1-3 per cent. overload continuously with mechanical draft. Let us see how this works out, 26,000 divided by 3 equals 8,666.66 square feet heating surface required for the whole plant. Let us divide this into four units and see what we get: 8,666.66 divided by 4 equals 2,166.66. The normal capacity for each unit is 2,166.66, which multiplied by 3 equals 6,499.98 pounds evaporation per hour. 6,500 multiplied by 1.33 1-3 per cent. equals 8,667 pounds evaporation per hour at 33 1-3 per cent. overload. Now if it becomes necessary to cut out one of our boilers at any time we can evaporate 8,667 multiplied by 3 equals 26,001 pounds of water per hour, the required capacity. Therefore, by installing four boilers we get the best efficiency and save the price of a spare boiler, extra floor space, valves, piping, etc.

Shaking grates,automatic water controllers and soot cleaners are three trimmings necessary for good results. Automatic water controllers give steady feed, and if we want clean boilers, Saturday morning as well as Monday, we must install soot cleaners.

Gases leaving our boilers running normal should be about 475 degrees. This, one of our largest by-products, we cannot afford to lose, although many do. If in the mill you were making ten per cent. waste, would you be willing to throw it away? No, you watch very closely to see that every pound is saved and sold. Let us put in an economizer and save a large per cent. of these heat units. It must be remembered that this apparatus is constantly under greater pressure than the boilers, and it pays to invest in the best. In principle they are alike, but in design of details and durability there is a vast difference.

We won't make the mistake of many and buy one too small. It is a custom to figure an economizer on a 40 minute basis. That means that it takes the amount of water to be evaporated 40 minutes to pass through it. That is too small; a 50 minute basis is better. It may not raise the maximum temperature much but it will the minimum. Many will say that the up-keep of an economizer, with the interest and depreciation, will balance the savings. Let us see how this works out in our plant. A well equipped plant of 2,000 indicated horsepower will run on 1.5 pounds of coal per horsepower per hour. With a 54 hour week and 52 weeks in the year the total coal consumption will be 3,760 tons. It has been proven by numerous tests that an economizer will save from eight to ten per cent. In our case that would be 327 tons, and at $4.50 per ton the gross saving would be $1,471.50. Our machine would cost us $4,165.00. Allowing ten per cent. for interest and depreciation and two per cent. for maintenance, which is more than ample, or $500, we now have a net saving of $971, or 23 per cent. of our investment. This machine will pay for itself in four years. We cannot add to the cost of this any part of the building, for it takes unoccupied

space. Some men say they cannot install an economizer, it would kill their draft. The loss in draft from one end to the other will average about .2 of an inch. It is not generally understood that with the extra heat units given the feed water by the gases, less call is made upon the boilers. This means thinner fires, less coal to be burned and less gases to be taken care of. Hence the loss of draft by the economizer is off-set.

With draft we get the capacity of our boilers. It is as important in obtaining our rating of the boiler as the grate or heating surface. The time is not far distant when this item will not be omitted in quoting the horsepower of a boiler. A current of air passing up through the grates and fuel, supplies the necessary oxygen for combustion. The hot gases follow up through the tubes, through the economizer, and up the chimney. The greater the difference in temperature between the gases in the chimney and the outside atmosphere, and the greater the height, the more pressure we get in the ash pit. The stronger current gives us more oxygen, therefore a higher rate of combustion, and increases evaporation. Theoretically, a chimney 100 feet high will give us .6 inches at the base, with gases inside at 450 degrees and atmosphere 60 degrees. In our plant we would need one 160 feet high and six feet in diameter at a cost of about $5,000.

An induced draft system with a 75-foot steel stack would cost with a relay engine about $2,000 and give us control of our oxygen, rate of combustion, and amount of evaporation per square foot of heating surface; or in other words, double the capacity of our boilers if necessary. This draft is preferable to forced draft, as it gives you power where wanted, at the foot of the stack. Forced draft pushed beyond a certain limit chokes up. An induced draft cannot do this.

Remembering that we are not to make any unnecessary by-product, we will install a six-plunger power pump, and not a steam pump, for our day feed to the boilers. However, we will provide a steam pump, but for emergency and night feed only. In installing feed piping, the mistake often comes with too small pipe at the boilers. In this plant all feed pipe will be 4-inch brass with 2-inch branches to each boiler. There are two points to be gained with ample size feed pipes. One is to protect the pump and economizer from excess pressure, and the other is to have controller valves large enough to supply with small lifts.

Let us carry our steam now from the boilers to the engine. In erecting our sixty feet of main steam pipe, running through the center of the boiler room, we must guard against two evils, vibration and loss of pressure. One is caused by the sharp cut-off of the high speed Corliss valve, and the other by friction, radiation and lack of supply.

It is seldom we have the opportunity to prove the value of a receiver by installing one after a plant has operated without it. There is one place, and one only, to locate a receiver to obtain all of the best results, and that is directly over the throttle. The Fitchburg Yarn Company tried out the value of a receiver in the main steam line over the throttle with interesting results. When building they omitted to install one. The vibration on this line was unusually severe, breaking the wall braces, also the Van Stone joints close to the boilers. After putting in a receiver this trouble ceased.

We will put in a 24x54x60-inch cross compound Corliss engine, running at 85 revolutions or 850 feet piston speed, with a boiler pressure of 190 pounds and receiver pressure of 18 pounds (gauge pressures), a 26-inch vacuum in the low pressure cylinder and a low terminal pressure of 9.75 pounds absolute, we will obtain 2,000 horsepower with a steam consumption of 12.4 pounds per indicated horsepower.

Expansion of steam is the success of the compound engine, and with a low receiver pressure you cannot equalize the load. In 1906, a mill in Massachusetts threw out a pair of simple condensing engines, and replaced them with a cross compound, looking for increased economy. The coal consumption increased. Looking into the conditions, it was found they were running with a low receiver pressure of 8 pounds, throwing the most of the load on the high pressure cylinder, thus destroying the efficiency by reducing the number of expansions.

You will note I placed the vacuum at 26 inches in the cylinder, not at the pump or exhaust pipe. This is a figure seldom reached with reciprocating engines. The success of the turbine is its high vacuum realized by placing the condenser close to the exhaust nozzle. Looking at some steam plants, one might imagine the engine was installed and the condenser placed wherever there was room, regardless of turns or distance.

By placing the heater under the cylinder we do away with one turn. At the other end of the heater we drop directly into the condenser. By this plan we vary 1.5 inches between cylinder and condenser, ¾ inch of this being accounted for by the heater acting as a partial condenser.

The exhaust of our engine, like the waste gases, is a necessary by-product that can be partially reclaimed with an exhaust heater. This heater must have not less than ½ a square foot of heating surface per boiler horsepower and the steam must go round the tubes, not through them. Care must be taken not to congest the area of exhaust. Some will ask why put in an exhaust or primary heater when the exhaust of the condenser will heat the feed water to 150 degrees or in some cases 200 degrees, before going to the economizer. That is too true in a great many cases and where you find it you may be sure the condenser is consuming too much steam. I can cite you a mill where 22,400 pounds of water is going through the heater per hour. This water is raised from 124 degrees to 200 degrees, or 76 degrees by the exhaust of a condenser hooked up to a 700 horsepower cross compound engine. How much steam is this condenser using? Twenty-two thousand four hundred multiplied by 76 equals 1,702,400 heat units. One pound of steam at atmosphere contains 1,146 heat units; 1,702,400 divided by 960, or all that we can realize equals 1,773 pounds steam per hour used by the condenser. The engine itself should not use over 9,000 pounds, 1773 pounds of steam for the condenser is 20 per cent. of the steam used by the engine. Rather a poor investment, still this mill feels proud to know they can raise their feed water to 200 degrees without an economizer.

Too little thought has been given to the steam consumption of a condenser. In purchasing a condenser the builder must guarantee two things, steam consumption and vacuum in inches under normal conditions. The best twin vertical air pump and condenser for our plant would use about 1,800 pounds of steam per hour. Our condenser must not use over 800 pounds per hour, and the only type that does this is one driven by a Corliss engine. We will provide a closed heater for the exhaust of this condenser.

With a 27½-inch vacuum in the exhaust pipe we should get our feed water in the primary heater to 108 degrees. Feed water leaving auxiliary heater at 142 degrees and through the economizer to the boilers at 230 degrees.

There is practically no waste in heating a mill with the hot water system, using a turbine circulating pump and live steam coils returning condensation to the boilers. This system should heat a textile mill in any part of Massachusetts for 50 cents per horsepower per year. The old style hot water system used a high speed reciprocating engine for circulating. This engine suffered more or less from lack of attention. The turbine is practically foolproof.

It is of importance that we make provision for the storage of our coal. The difference between the price of coal in the car or vessel and the price in the fire-room is an item to be considered, and runs up rapidly in the winter.

The nicest way to handle car coal on a 2,000 horsepower plant, hand fired, is, if possible, with a spur track run into the yard on a trestle not less than 25 feet high. We have in the past labored under the impression that in storing coal through the winter, especially out in the open, a generous amount of its value was absorbed by the atmosphere. It is true that inflammable gas, made up chiefly of methane, escapes from coal, some more than others, not only in the mine but a long time after, but investigations and experiments made by the United States Bureau of Mines have shown that the deterioration of high-grade coal while in storage is very slight; in friable low volatile coals like "New River" and "Pocahontas," the loss in four or five months is usually less than two per cent., and in hard low volatile coals like "George's Creek Cumberland" it is less than one-half of one per cent. They, therefore, recommend the storage of coal in the open instead of under cover, where there is greater liability of spontaneous combustion. Their exhaustive tests have also revealed the fact that oxygen is just as wasteful an element in coal as ash. In other words, coal showing six per cent. ash and 3 per cent. oxygen is no higher in heat value than coal showing 8 per cent. ash and 1 per cent. oxygen.

The old style of buying coal by its name is practically dead and should not be thought of by intelligent men, as we all know that poor seams can be found in all coal districts. Different methods have been advised for the purchase of coal, one of which is the B.t.u. basis. This is a beautiful theory, but a practical failure. Heat units should regulate the value or price, but in making a contract there are other elements in coal and conditions of the individual plant to be considered.

We have completed, for $84,000, what we believe to be a first-class modern plant for a textile mill, capable of producing the most economical results. It now remains for the operating engineer to bring them out.

Gentlemen, I want to state a few facts with no intention of being disrespectful. You, as textile managers are not engineers, and never will be. This is an age of specialization. To be proficient or masters of a profession one must give his undivided thought and attention to it. You love the sound of a spindle as the engineer does the pulsation of the steam plant, or the heart of the mill. This love is formed by contant association, overcoming daily vexing problems, watching and preventing, if possible, disorders that all things mechanical are heir to. As mill managers you are students of human nature. You have selected, you believe, the best material available as engineer. Hand him the key and demand results.

The Business Meeting.

The report of the nominating committee, of which C. T. Plunkett was chairman was read, and the following nominated to fill the offices of president and vice-president and the vacancies in the directorate:

President, Edwin Farnum Greene, treasurer of the Pacific Mill, Lawrence, Mass.; vice-presidents, Frederick A. Flather, treasurer of the Boott Mills, Lowell, Mass., and George P. Grant, Jr., treasurer of the Grant Yarn Company, Fitchburg, Mass.; directors, William M. Butler, president of the Hoosac Cotton Mills, North Adams, Mass.; William N. Kimball, superintendent of the Social Nourse Mills, Woonsocket, R. I.; Albert Green Duncan, treasurer of the Harmony Mills Company, Cohoes, N. Y. This ticket received no opposition and was unanimously elected.

The following new members were elected to active membership:

Dr. Matthew S. Borden, American Printing Co., No. 90 Worth St., New York; Henry W. Buhler, of the Buhler & Emerson Conditioning Laboratory, Boston; Stuart W. Cramer, president of the Mayes Manufacturing Co., Charlotte, N. C.; James Leroy Harring, superintendent of the Bennett Mills, New Bedford; John C. Hebden, vice-president and general manager of the Franklin Process Co., Providence, R. I.; Arthur C. Homer, treasurer of the Pilgrim Mills, Fall River; George I. Macy, superintendent of the Soule Mill, New Bedford; E. N. Murti, cotton manufacturer, Mandapaka, Tanuka Tahu, Kristna St. Madras, India, who becomes a life member; Isaac T. Prosser, Supt. of the Harmony Mills, Cohoes, N. Y.; Chas. O. Richardson, treasurer of the Warwick Mills, Boston; Malcolm B. Stone, treasurer of the Ludlow Manufacturing Associates, Boston; Philip M. Tucker, banker-president of the Boston Machinery Co., Boston, and William J. Wilson, superintendent of the Oxford Linen Mills, North Brookfield.

Associate members were elected as follows: George A. Cutter, manager of the Cell Drier Machine Co., Taunton; Rogers W. Davis, agent for the Kitson Machine Shop, Lowell; Perry Kenyon, Chapel Field Works, Dukinfield, England; Charles M. Mumford, chief assistant on textile work of Lockwood, Greene & Co., Newton Centre; J. Henry Thorpe, sales agent for the United States Bobbin & Shuttle Co., Providence, and Malcolm E. Whitman, of William Whitman & Co., New York.

An Englishman doing business in Russia and having a wide connection in the cotton industry, informs one of the commercial agents of the Department of Commerce and Labor that he desires to be put in communication with American manufacturers of textile machinery except the regular carding and weaving machinery. He is particularly interested in specialties of machinery, such as knitting machines, electric cutters for knitting and garment-making mills, any special labor-saving devices, pumps for water, supplies such as bobbins, spools, shuttles, belting, etc. Correspondence may be in English, but prices should be quoted in pounds sterling. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 7824.

Mill Conditions and Market Reviews.

SOUTHERN MILL SITUATION.

(*Special Correspondence.*)

April opened with the meeting of the American Cotton Manufacturers' Association at Washington, D. C., on the 2nd, lasting through the 4th. This meeting was held at Washington just at this time in order that the Southern manufacturer might have an opportunity of presenting himself and his views at close range during a session of Congress. The time was well selected, and no opportunity was lost which might be used to the advantage of the Southern cotton manufacturer. The Tariff Board presented its report on the cotton schedule just previous to the meeting of the Association, and the matter of the report was debated in committee; the Association putting itself on record as favoring a lowering of the tariff on those schedules which showed an excessive tariff in relation to the cost of manufacturing here and abroad, retaining, however, whatever tariff necessary for the proper protection of the industry.

A meeting of the Soft Yarn Spinners was held at Charlotte, N. C., last Wednesday, 24th, but none of the particulars have been obtainable. It is believed though that a permanent secretary was decided on, and a program mapped out for the coming fall season.

The Southern mills continue in a well sold up condition, and are yet naming the prices at which they will accept orders from the buyers. On most all lines the mills have all the orders they can fill, and are not in the market at any price. In the knit goods market goods have advanced beyond any expectation, and buyers are serambling for goods on prompt deliveries. Many mills have taken orders that will keep their mills busy until late into the fall season, and it is feared that when the fall demand begins to come in it will be impossible to meet the requirements, and the manufacturer will still hold control of the prices. It is almost impossible to meet the nearby requirements in light weight goods which were late coming in.

In the yarn market much the same condition has been prevalent and it is the spinner who holds the reins. Knitters are probably the ones who are in most need of yarns, but the weavers are also short and are taking spot lots wherever they can be procured and at prices which a month ago they would have thought unreasonable. Cotton has moved up about 100 points during the month and is now selling at 12 cents, which necessitates a new price basis for goods and yarns. Buyers expecting the spinners to have large stocks on hand which they would be glad to rid themselves of, bought lightly during the first of the month, and as spinners have refused to meet the prices which they quoted they are now buying their requirements hand-to-mouth as they can be procured. Inquiries for quotations on spring 1913 lines met with no response as spinners are unwilling to make any prices with cotton on an uncertain basis. Prices have steadily advanced, spinners will not accept orders beyond October, deliveries are hard to obtain, there is practically no stock on hand either with the dealer, buyer, or mill, and there is no sign of an easing of conditions. The greatest range of price noticeable during April has been in two-ply skeins, 30's were selling at 24 cents last month and are now quoted at 26½.

Much the same might be said of the cloth markets, which are also well sold ahead. The greatest demand has been on fancy cloths, dress ginghams, etc. Bleached cottons have moved upward steadily, and at present buyers are paying higher prices for many lines of bleached cottons than they were last week. Jobbers have been on the jump trying to get in their orders. They thought prices were as high as they would reach this season, about four weeks ago, and have been placing light orders, consequently they now find themselves with prices much higher and it is imperative that they place orders. Converters looked forward and saw that there was going to be a higher price level, and consequently they are more nearly covered than are the jobbers. Export sales have shown a slight increase.

There has been a total of 95,778 spindles and 1,815 looms planned and contracted for during April in Southern cotton mills, only in one case does any of this machinery substitute for old equipment and this is in the case of 200 new looms being placed where 200 old looms are being taken out. This consists almost entirely of additions to the present plants, as there was only one cotton mill to be organized during the month. The Johnston Mfg. Co., of Charlotte, N. C., has been organized by C. W. Johnston, president of the Highland Park Mills of Charlotte, N. C., and the company will erect a 5,000 spindle mill to manufacture coarse yarns from waste, etc.; full plans and details have not been decided as yet.

There have been several new companies incorporated, though none were strictly cotton mills for the manufacture of cotton goods. The Good Stocking Company, of St. Louis, Mo., has been incorporated with $25,000 capital stock. The Marvel Underwear Co., Louisville, Ky., incorporated with $10,000 capital. The Cotton Fibre and Mattress Co., Henderson, N. C., with $50,000 to manufacture cotton fibre, jute fibre, and cotton mattresses. The Freeze Hosiery Mills Co., Hendersonville, N. C., incorporated with $25,000.

The following mills have increased their capitalization: Hope Mills Mfg. Co., Hope Mills, N. C., increased by $150,000 preferred stock, for the purpose of improvements; Davis Hosiery Mills, Chattanooga, Tenn., have increased capitalization from $250,000 to $500,000; Aldora Mills, Barnesville, Ga., have increased from $125,000 to $200,000 for the purpose of adding 12,000 spindles; Granite Falls Manufacturing, Granite Falls, N. C., has amended charter so as to issue $30,000 preferred cumulative 8 per cent. stock.

The Riverside and Dan River Cotton Mills are planning the building of a $1,500,000 new mill to the plant already in operation at that place. Contract has been placed for 165 looms to be added at once. The Jennings Mills, Lumberton, N. C., are adding 2,000 spindles and 16 cards. The Sylvan Mills, Shelbyville, Tenn., will add 36 looms. Twine Mills Corporation, Roanoke, Va., has contracted for 3,000 spindles. P. H. Hanes Knitting Co., Winston-Salem, N. C., will erect a new dye house at a cost of $1,500. Barringer Mfg. Co., Rockwell, N. C., will add 3,000 spindles. E. A. Smith Mfg. Co., Rhodhiss, N. C., have contracted

for the building of one new mill, and an equipment of 15,000 spindles. Monarch Mills, Dallas, N. C., will add 1,000 spindles. Norris Cotton Mills, Cateechee, S. C., will add a hydro-electric equipment. Rolin Mfg. Co., Lincolnton, N. C., will add 2,300 spindles and steam plant. Wm. E. Hooper & Sons Co., Baltimore, Md., have contracted for a new building. Union-Buffalo Mills Co., Union, S. C., will add $150,000 power plant. Mayes Mfg Co., Mayesworth, N. C., have contracted for 5,473 spindles, 10 cards, 5 speeders, 4 combers, 1 ribbon lapper, 3 twister frames, 5 spoolers, and 2 reels. Rosemary Mills, Roanoke Rapids, N. C., have contracted for 814 Jacquard looms, and are making other improvements. Lowell Cotton Mills, Lowell, N. C., are adding 5,000 spindles. Lilian Knitting Mills, Albemarle, N. C., are building a large annex to double the capacity of plant. Roberta Mfg. Co., Concord, N. C., planning rebuilding with 2,000 spindles. Greenwood Cotton Mills, Greenwood, S. C., are planning and will add 20,000 spindles. Deep River Mills, Randleman, N. C., have contracted for 30 cards and 25 deliveries of drawing. Marion (N. C.) Mfg. Co. has changed former plans and will increase present plant by addition of four-story building, 25,000 spindles, 600 looms, two 250 hp. boilers, and 42x48 engine. Stonewall (Miss.) Cotton Mills are making additions to the dye plant. Ledbetter Mills, Rockingham, N. C., will add two-story 75x150 foot building. Darlington (S. C.) Mfg. Co. will substitute 200 40-inch automatic looms for 200 36-inch looms.

Change of organization: The Georgia Cotton Mills, of Dublin, Ga., have been sold to the Eastman (Ga.) Cotton Mills for about $100,000 and will be put into operation. The Grace Mills, Salisbury, N. C., has been sold and reorganized at the Princeton Mills with a capital of $50,000. Belton (Tex.) Cotton Mills have been sold to satisfy bonds amounting to $50,000. The Lily Mills and the Rhode Island Mills, of Spray, N. C., have been sold to the Thread Mills Corporation, of Indiana, a branch company of the Marshall Field Co. Tavora Mills, Yorkville, S. C., is a reorganization of the Tavora Mills, which were sold recently. The capital stock of the new company is $25,000. Liberty Cotton Mills, Liberty, S. C., is to be sold May 7 to satisfy mortgages. The Walhalla Mills and the Seneca Mills, of South Carolina, are considering liquidation of present organization. The Trion Mfg. Co., at Trion, Ga., will be sold the latter part of May.

The Merrimack Mills, Huntsville, Ala., are contemplating extensive improvements. LaFayette (Ga.) Cotton Mills expect to increase the present equipment considerably. A cotton mill is being planned by R. J. Stough, of Cornelius, N. C., but plans will not be matured for some months.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence.*)

The optimism reflected in the reports of a month ago has been fully continued in the interval and at this time the mills are more generally employed than they have been since 1907. Improvement has gone on despite many influences that would exert a depressing effect in ordinary periods of trade. The prolonged curtailment of production and the continued liquidation of stocks of merchandise in the hands of jobbers and retailers have finally brought about the reaction in demand that must come to a country of 90,000,000 people untouched by famine or generally widespread evil forces. The improvement has come despite tariff agitation, late planting of crops, rising values in many lines, and unusual complications with labor.

All the New England cotton mills were finally forced to pay an advance in wages averaging ten per cent. The Lowell mills were closed four weeks, and strikes occurred at Clinton, Mass., and elsewhere but have finally been settled. It is not certain in the minds of New England manufacturers that the end of wage advances for the year has been seen and the intense radicalism that has been rampant in the section has been fed by political battling of the gravest character.

Cloth prices are higher than they have been in months and at this writing, although the immediate demand is quiet, there is an undertone of firmness that has not been seen in cotton mill centers in years. Standard drills have risen to a basis of 8 cents, bleached sheetings to 8½ cents for Fruit of the Loom, A C A tickings to 13¼ cents, print cloths to 5 3/16 cents for wide goods, flannellettes to the highest basis prevailing last year, staple prints to 5¼ cents, and staple ginghams to a nominal basis of 6¾ cents, although the leading line is held "at value" for the moment. Prices are generally on a basis of profit, although cotton is quoted around 12 cents.

The improvement has not been reflected in fine combed yarn goods, nor have the mills in all sections yet been able to operate all their machines, because of a lack of satisfactory labor. It is estimated that not more than 80 per cent of the fine yarn looms are in operation and there is a dearth of orders booked on narrow plain fine combed yarn cloth for the last half of the year. The print cloth mills are generally well sold for two months ahead. Many of the mills making specialties in gray cloths, for linings, corset coverings, etc., are well engaged as far ahead as they will take business. The colored goods mills are generally well contracted ahead through October. The cotton blanket and napped goods mills have excellent orders that will carry them into the late months.

Stocks of print cloths at Fall River are less than a normal three weeks' output, and they include a wide variety of odd constructions that accumulate quickly in a center of 100 mills. Sales for contract delivery will take care of a full product for the next five weeks, and of a three fourths product well through June. The most that is hoped for in the way of spot offerings is a limit of 40,000 pieces weekly and much of this is virtually bespoken.

Bleached cottons of the well known brands are under order through May and on many numbers there can be no accumulations for two months unless trade falls absolutely flat. The cleanup of stocks has been wonderfully close. Finishers are being pushed for deliveries on muslins, cambrics, longcloths, and similar merchandise. The fine combed yarn bleached cloths such as india linons and lawns, have been slow sellers for some time, but there has been a tendency in the past week or two to limit the output and sell only spots. This is having a tendency to induce the placing of contracts by converters who must look ahead. The certain scarcity of grade staple cotton is becoming a factor of large importance with fine goods manufacturers and users.

Prints and percales have been sold very freely for delivery ahead. All the large printers on staple cloths are busy. The idle machines are those that are usually devoted to the fine printed batistes, lawns, and similar goods. The export

trade done in prints this year by the American and Algonquin companies has been the largest ever done in a similar period of time and shipments on these orders will go on for some months. It is roughly estimated by printers that they did a six months normal trade before the 15th of April of this year.

The situation on staple ginghams is a very strong one. Amoskeag staples have been held at value at 6¼ cents and many orders have accumulated. The long closing of the Everett and Lancaster mills intensified a scarcity that already existed in well known staple ginghams and it will be several weeks before a normal balance in the markets is possible. Low priced dress ginghams have sold in a moderate way, but the 12½ cents retailing goods are still moving slowly from jobbers' stocks. Shirting chambrays for fall delivery will be formally opened in a week or two and it is expected that the price will not be much above the level of last year. Shirtings have sold very fairly in the better grades.

Dress cottons in the finer grades have sold moderately. Welts, piques, silk striped poplins and voiles, and some varieties of silks and cottons have been selling fairly well but at close prices based upon current high costs. The absence of trade in printed batistes, fine lawns, organdies, and many of the sheer piece dyed fabrics has limited the loomage engaged for the future. White goods in semi-fancy grades, such as crossbar checks, cluster cords, nainsooks, jacquards, dimities, etc., have not enjoyed a normal sale, largely due to adverse weather conditions in all parts of the country during April.

The position of mills making napped goods has become a very strong one. On Amoskeag flannellettes prices have been lifted 1 cent a yard from the opening figures and this large plant would not undertake deliveries on new orders before October. Canton flannels were sold within a week after they were opened and a distinct scarcity is already evidenced in jobbing houses because of the quick orders for fall deliveries that came in from the retail trade. Cotton blankets, domets, mottled flannels, and solid color flannels are sold as far ahead as mills can go without anticipating a new cotton crop that has not yet been planted. Prices have appreciated since the opening but the great bulk of the business was taken before wage increases, cotton advances, or an abnormal demand were apparent.

It is several years since mills making denims, colored duck, cheviots, tickings, and similar goods have had orders tendered to them in such volume. Leading mills are booked ahead till September and commission houses are making every possible effort to hurry out goods for spot shipment. Crashes and towellings are under order in leading mills through August and complaints are general of unsatisfactory deliveries. On all grades of duck and heavy specialties still made in the section all the business that can be taken for the summer is in hand.

Leading bleachers and finishers are being urged to get out all goods on order. The volume of forward business booked is not so large as in some seasons on the finer goods because of the slow sales on contract, yet orders in hand are of an urgent character so that for the moment the future possibilities are attracting little attention. Competition for business in fine yarn mills is still sharp. Orders have been more plentiful, but returns have not been so satisfactory as those noted in recent contracts taken by cloth mills. There has been a distinct quickening in the call for miscellaneous webbing, tape, and general products, while the calls for curtain cloths, draperies, etc., has been expanding steadily.

New England knitters are generally well employed. Such mills as the Otis, Ipswich, Lawrence, and others, are very busy and will be kept busy all through the fall season. But prices have not gained so well in this quarter as in cloths and manufacturers are quite content to extend fall business and not hurry the opening of spring lines for 1913.

While general conditions are so much better than they were three months ago, a noticeable amount of conservatism is manifested by all the leading factors in manufacturing. There can be no doubt of the extent that so called Socialism has found a place among irresponsible workers and this has been fanned into a fury by the wild political struggle among national Republicans working in Massachusetts. The National Cotton Manufacturers' Association reflected this conservative feeling by the strong tone assumed in tariff resolutions. It seems to be recognized that it is imprudent to mis-state the attitude of most manufacturers on the matter of protection lest an assent to some form of revision may be translated into assent to new and untried policies.

The machinery builders have been adding to their orders in a steady way. The exhibition at Boston in conjunction with the association meeting was the most illuminating thing of its kind seen in recent years, or since the abandonment of the fine textile exhibits that were formerly made in the Mechanics Building triennially in Boston. It was stated at Boston that most of the large shops are gathering new working forces daily and they are slowly increasing their working hours. A very considerable number of small orders is coming in and if the present outlook for profits in the industry is maintained it is expected that the year will close with all the shops running in full. The new Pilgrim mill at Fall River is in operation and has already sold most of its possible output for three months. There are three or four plants contemplated in different parts of the section but they have not taken form and machinery people say nothing definite will be determined upon until after the national conventions in June.

MONTHLY REVIEW OF THE COTTON MARKET.

(*Contributed Exclusively to* COTTON).

BY H. AND B. BEER, NEW ORLEANS.

During the past month the tendency of the market continued upward owing to the incessant rains having prevailed in nearly all sections of the cotton region, and while the precipitation was light as a rule, excessive rains occurred in Louisiana, Mississippi and Alabama. As yet there is no improvement in the weather, but since so much rain has been had the past two months, chances are that good weather will soon be the rule. If wet weather should continue for any further length of time, it is probable that present price-levels will be maintained, perhaps put somewhat higher. But if the needed dry, warmer weather is had in the near future, and should last for awhile, probabilities are that the market would experience a sharp decline.

The backwardness of the crop in the central portion of the belt was put back all the more by the breaking of numerous levees along the Mississippi river in Tennessee, Arkansas, Mississippi and Louisiana. But the land inundated does not produce more than 300,000 bales. However, these

crops will not be lost, only delayed, as it will be impossible to plant until the water recedes, which will be sometime next month. Already the water is falling as far south as Natchez, Miss., and it is thought that the worst is over. In former high water years good crops were made after the waters went down.

Prospects in the South Atlantic states are better than in the Mississippi Valley, the rains of late having been light in that section, permitting farm work to make progress. There is a good season in the ground, the acreage will not be reduced very much and sales of fertilizers are increasing.

In Texas and Oklahoma, while there are complaints of wet weather interfering with field work, the outlook was never more favorable, as good rains have been had in all districts of the Southwest, and the supply of reserve moisture, especially in the arid sections of West Texas, is the best in many years.

As a whole the crop preparations, while much backward compared with last year's early start, are not much behind the normal. Cotton is already up in sections of South Georgia and the Central Gulf States and has been up to a good stand for a long while in Southwest Texas, and is now coming up in the southern portion of this state. In Texas the crop is said to be further advanced than at this time one year ago, the wet weather notwithstanding, as seed, which will be the case in all sections of the belt very shortly, is germinating very fast. If a spell of good weather could be had for ten days or two weeks much work would be accomplished, and much of the backwardness in preparations and planting would be recovered, even in the central portion of the belt outside of the river districts.

It is said that an American crop of 14,000,000 bales will be required for next season, but even if such should be the case, the fact remains that such a yield would provide a total visible and invisible supply as large as this season's, which is about 18,250,000 bales of American, because the surplus at the end of this year, visible and invisible, will be about 4,250,000 bales. Furthermore, if the South should make 15,000,000 bales this year, next season's total supply would be larger than this season's record supply by about 1,000,000 bales, and if a yield of 16,000,000 bales is produced, next season's supply would be 20,250,000 bales of American alone, or about 2,000,000 bales larger than this season's production, which, last December, was sufficient to force the market below 9 cents. It must be remembered that the duplicating of last year's large crop is a possibility even under present conditions, for while the Atlantics and Central Gulf states may not make as much cotton this year as they made last year, prospects in Texas and Oklahoma are decidedly better than one year ago, as Texas did not do any too well last year on its large acreage, owing to too much dry weather, while the season in Oklahoma, considering the big increase in acreage, was practically a failure owing to the severe drouth in that state last year. This year Texas and Oklahoma will be capable of making 1,000,000 bales more than one year ago with anything like favorable weather conditions during the remainder of the planting and growing season.

The American Protective Tariff League, No. 339 Broadway, New York, will furnish gratuitously information and facts on any phase of the Tariff question, on postal card request.

THE YARN MARKET.

Owing to the increase in the price of the raw material and to other influences, the yarn market continued on a very strong basis through the entire month. While very little business was done early in the month, as the raw material prices increased, the buyers appreciated the fact that in order to get yarns at all they had to meet the spinners prices and business became better. Inasmuch as the average amount of yarns on hand in many factories were small, the buying for immediate delivery became imperative and spinners that had yarns on hand for immediate or nearby delivery were in the best position as regards prices.

The month opened with the conditions very quiet, owing to the high prices asked by the spinners blocking a great deal of business that at that time was tentative only. Hosiery yarns seems to have a little the advantage of weaving yarns as far as prices and orders were concerned. Many manufacturers returned from the recent meeting of the American Cotton Manufacturers' Association at Washington enthused over the outlook and predicted a boom as regarding higher prices as a certainty. The scarcity of some numbers of weaving yarns was not so marked as was the case a short time ago. The trade in the Boston market seemed to be a little more active than had been the case for some time past, but users of yarns were only buying from hand to mouth and were unwilling to contract far in the future because of the comparatively high prices ruling.

As the month wore on, the increasing raw material prices gradually backed up the yarn situation and as the demand for knitting yarns broadened considerably, the situation began to show an improved aspect. The market became fairly active and some spinners withdrew their prices and resubmitted bids on higher levels, because of the raw cotton advances. It is predicted that combed yarns will sell higher than they did in the boom times of 1907 before the present year closes. Buyers were showing more anxiety regarding spot and nearby delivery at this period as the alleged April accumulation of yarns were not showing up. Owing to the improvements in the knitting trade, a much better demand is coming forward for knitting yarns, and prices were being gradually forced to higher levels.

As the month closes yarns are showing generally stronger and advances are still being reported. Spinners remained universally firm. It is evident everywhere that buyers are anxious for spot yarns and prompt or nearby delivery is the call on all sides. Weavers are buying heavier lots and underwear manufacturers are regarded as being in a strong position with many jobbers short of stock. Some inquiry for carded yarns for late deliveries and combed yarns remained firm, with predictions for further advance. Many dealers predict that before October, prices on combed yarns will be higher than they have been for years. It is reported that some large Southern plants are not open for new business before July, while several others have substantial contracts running into November. Large spinners of weaving yarns, particularly in the South, are keeping well posted on current prices offered and therefore are not disposed to accept orders as readily as was the case in some years when information was not being circulated so freely among them.

There are still quite a few buyers in the market who

believe that spinners are bluffing and that their mills are not as well sold ahead as they would have buyers believe. It is also claimed by weavers that they cannot afford to pay the high prices which spinners are asking for yarns on the profit margin on which they are now working, in spite of the recent advances on finished goods. However, the spinners are holding firm to the prices and in many cases advancing them slightly. The fact that the general trend of the prices is upward seems to have aroused some buyers to the fact that prices are not likely to be any lower for some time and deliveries are going to be exceptionally hard to secure. The result is shown in increased orders and inquiries that are coming forward through commission houses and dealers with the buyers gradually advancing their offers. Weavers are in the market more frequently than has been the case for some time and while they are protesting strongly against paying the prices spinners are asking, many of them "vowing they would ne'er consent consented."

The New York quotations at the close of the month are as follows:

SOUTHERN SINGLE SKEINS.

4s to 8s	16½@17	20s	20½@--
10s to 12s	17 @18	24s	20½@--
14s	18 @--	26s	21 @--
18s	19½@--	30s	25 @--
20s	20½@--	40s	30 @31

SOUTHERN TWO-PLY SKEINS.

4s to 8s	19 @19½	36s	32 @--
10s to 12s	19 @19½	40s	32½@33½
14s	19½@--	50s	40 @--
16s	20 @--	60s	46 @--
20s	21½@22	3-ply 8s uphol-	
24s	23 @--	stery	18 @--
26s	23½@24	4-ply 8s uphol-	
30s	26 @26½	stery	18 @--

SOUTHERN SINGLE CHAIN WARPS.

10s to 12s	18½@19	24s	21½@--
14s	19 @19½	26s	22 @--
16s	19½@20	30s	26 @--
20s	21 @--	40s	33 @--
22s	21 @21½		

SOUTHERN TWO-PLY CHAIN WARPS.

8s to 10s	19 @--	26s	24½@--
12s to 14s	19 @19½	30s	26 @27
16s	20 @21	40s	32½@33½
20s	22½@--	50s	40 @41

SOUTHERN PEELER FRAME CONES.

8s	18 @--	18s	20 @--
10s	18¼@--	20s	21 @--
11s	18½@--	22s	21½@--
12s	18½@--	24s	21½@22
14s	19 @--	26s	23 @--
16s	19½@--	30s	24 @24½

THE KNIT GOODS MARKET.

The knit goods market for the past month, clear up to the last week, has been one of constant increase in orders and bright business outlook. The last week of the month was considerably quieter, but prices held very firm. A number of Southern knitting mills visited in the early part of the month were all rushed to capacity and as the vice-president of one concern expressed it, "The amount of goods sold is limited only by the amount of labor available to fill the orders." The outlook, particularly in the hosiery line, is very bright and many mill proprietors are more optimistic than they have been in many months.

The beginning of the month continued the indications of last month, that business was improving and improving rapidly. This was evidenced in the hosiery trade by the fact that there had been quite a number of advances of more or less importance. Many good sized mills were sold well ahead and were in a position to ask their own prices. Mercerized and lisle goods were in better demand and more buyers were looking for the medium weight, rather than the extremely sheer goods that have been the rage for so long. There was a steady duplicate call for spring lines which indicates a natural demand and probably reflects the shortage that is known to be present in the stocks of jobbers and retailers.

The underwear market at this period was not as active as was the hosiery market, although much interest was expressed in balbriggans. Deliveries were behind in many instances and quite a presentable amount of reorders coming in. Most underwear mills were running to their capacity and the market in both hosiery and underwear was decidedly a sellers market. The best feature of the better feeling in the knit goods market was that it was founded on better business conditions in the mills, rather than on optimistic ideas of what might happen later. Salesmen on the road did a good spring duplicate business for prompt and nearby deliveries and reorders for fall merchandise were also reported to be getting more plentiful. As was predicted some time ago, some buyers are beginning to experience difficulties in obtaining deliveries, particularly on popular lines.

With the middle of the month came the advancing raw prices, caused by the flooded conditions of some sections of the cotton belt and by the spinners strong stand on yarn prices and these acted as a deterrent factor, making the knit goods manufacturer hesitate somewhat. They were, however, beginning to think of the next spring season, and some have already made up sample assortments, while others are at it. There is a movement on foot among the knitters to have a later opening next year than heretofore, as they believe it will make a better market. Underwear mills continued busy, many running to their full capacity. Yarn salesmen reported much better orders throughout the state of Pennsylvania and a much more favorable attitude on the part of knit goods manufacturers. The hosiery market continued in better shape than that of the underwear branch, but the indications were strongly favorable for both. White and tan hosiery bid fair to be particularly scarce, especially the popular kinds. Mercerized hosiery continued in much better demand, but there was still a big business in the better lines of silk hose and half hose.

The Lawrence Manufacturing Co. advanced all lines of cotton hosiery 2½ cents, and this coupled with the fact that other prominent lines had been previously advanced seemed to indicate a general rise in prices on all cotton hosiery. The sweater situation livened up considerably and there seemed to be a strong likelihood of a general advance in prices along those lines. Plain stitches were the most popular. Knitted vests and knitted neckties were also in good demand at this period. Many spring underwear lines showed further advances particularly in the light weight goods, of which there seems to be the predicted shortage. The coming convention of the National Association of Hosiery and Underwear Manufacturers which opens in Philadelphia in May, is attracting considerable interest in the trade and will no doubt be well attended. It is a general opinion that the labor question will be taken up and thoroughly discussed during the convention.

As the month closed underwear manufacturers are becoming more conservative over accepting further forward orders at current prices on fall lines. The upward ten-

dency of cotton and the strength shown in the cotton yarn end of the market makes it very evident that lower raw material will not be available for sometime to come. In the hosiery market the demand is more active and supplies of desirable merchandise is decidedly scarce. Underwear manufacturers who can make immediate deliveries are reported to be doing a brisk trade. It is evident that many manufacturers of hosiery are endeavoring to get the buying public to make inquiries for medium weight lines. One prominent manufacturer places a tag on his half hose which reads, "The gauziest gauze. Do not expect this thin, gauze fabric, to wear as well as our regular or medium weight goods. We guarantee though that they will wear longer in the heels and toes than any other hosiery equally as light in weight and fine in fabric." When a manufacturer places a tag of that description on his goods, he does so because he knows they will not give satisfactory service as far as wearing qualities are concerned. As one disgusted buyer expressed it, "They may be good of their kind, but they are a poor kind." This is a fact that is known to every manufacturer of sheer fabrics and they are all trying either by the method outlined or by other methods to induce the buying public to cut out the very sheer styles and use the medium weights, which will give much better wear in proportion to the money invested. A good demand is reported for fine gauze full fashioned hosiery. Everything considered the outlook continues bright in the knit goods situation.

ANNUAL CONVENTION AND EXHIBITION.

The Annual Convention and Exhibition of the National Association of Hosiery and Underwear Manufacturers is to be held in Philadelphia May 6th to 10th. Both the Exhibition and the Convention will be held at the First Regiment Armory, Broad and Callowhill streets, this building having been decided upon in order to accommodate the increased demand for exhibition space over previous years. The officers and exhibitors feel very much gratified in being successful in securing the armory for the Convention and Exhibition, owing to the facilities afforded. The Exhibition will be on the main floor, containing 20,000 square feet of exhibition space. Many concerns who have never exhibited in the past have already booked space, and the knitting manufacturers who come to the Exhibition can be assured of an elaborate display and a representation of machinery, appliances, supplies, etc., that will prove of the greatest possible interest and value to them.

CONVENTION PROGRAM.

The morning session, Tuesday, May 7th, 1912, is an open session, to which the hosiery, underwear and fancy knit goods manufacturers are invited, members and non-members; also all the associate members. The meeting will be called to order promptly at 10:00 a. m., in the Veteran Corps Room of the First Regiment Armory, Broad and Callowhill streets. Opening remarks, Garnett Andrews, president. Welcome address, Hon. Rudolph Blankenburg, Mayor of Philadelphia. Annual report of the president. Annual report of the secretary-treasurer. Reports of assistant treasurer, standing and special committees, sub-associations, and executive committee. Address, "Lighting," by R. S. Iremonger, of the General Electric Co. Address, "Manufacturer and Selling Agent," by Charles Vezin, of Hinchman Vezin Co. Impromptu discussion. Communications. Miscellaneous business. Appointment of nominating committee.

The afternoon session, Tuesday, May 7th, will be an executive session. At 2:30 p. m., meeting of the various hosiery sub-associations, as arranged and announced at previous session. At 2:30 p. m., Convention Hall. Special meeting of the underwear members. Manufacturers not members may attend this session upon application to the secretary-treasurer.

The morning session, Wednesday, May 8th, to which only knitting manufacturers and associate members are admitted. Meeting will be called to order promptly at 10:00 a. m. in the Convention Hall of the First Regiment Armory. Address by Hon. J. Hampton Moore, Congressman from Third District, Pennsylvania. Address, "Modern Methods of Merchandizing," by S. R. Latshaw, of Curtis Publishing Co. Address, "The Use and Abuse of Special Packing," by W. W. Smith, of Estate of Thomas Johnson. Address, "Conversion of Knitting and Cotton Mill Waste," by Felix Brecher, of G. Josephy's Erben, Bielitz, Austria. Reports of committees, election of officers, and other business.

The afternoon session, Wednesday, May 8th, executive. At 2:30 p. m., meeting of the various hosiery sub-associations, as arranged and announced at previous sessions. At 2:30 p. m., Convention Hall, First Regiment Armory, special meeting of the underwear members. Manufacturers of woolen hosiery, gloves, mittens, sweaters and fancy knit goods at 2:30 p. m. will be provided with rooms, in which they may meet to discuss questions directly affecting their interests. See Bulletin Board at entrance to Armory.

On Wednesday evening, May 8th, will be held a banquet and vaudeville smoker, which will be given at the Scottish Rite Building, southwest corner of Broad and Race streets, beginning promptly at 8:30 o'clock. No expense will be spared in making this event one of special prominence in keeping with the Association's standing and achievements. This entertainment, including refreshments —liquid and otherwise—is tendered complimentary—free of charge—to the knitting manufacturers, exhibitors and advertisers in The Knit Goods Bulletin and Official Program and their representatives, but no one else will be admitted. It is exclusively for the knitters, their contributing friends and their bona fide representatives.

The morning session, Thursday, May 9th, will be for the knitting manufacturers—members and non-members. Admittance to hall will be strictly confined to those holding registration cards, which are given out from registration booth, in Exhibition Hall, or supplied by the Secretary-Treasurer. Meeting will be called to order promptly at 10:10 a. m. There will be open discussion on topics mentioned below. Net weight Yarns; Credit Bureau Department; Collection Department; Cancellations—How Best Corrected; Possibilities from an Arbitration Committee; Question Box.

The morning session, Thursday, May 9th, will be for the associate members. Admittance to hall will be confined to those holding blue registration cards, which are given out from registration booth. Meeting called to order promptly at 10:00 o'clock in Room C, First Regiment Armory. In addition to the discussion of topics to be announced later, a question box will be introduced, into which inquiries and questions may be dropped by any one present.

COTTON MANUFACTURING.

THE HELP QUESTION.

(*Contributed Exclusively to* COTTON).

BY F. W. G.

I have been greatly interested in reading the articles that have been printed in COTTON concerning the relation of the mill and the employee, or as we express it, the "hand" or "operative." COTTON is doing a grand and uplifting work in bringing before the employer the needs of the employee. At the same time, it gives the employee a feeling of confidence toward the employer, and makes him or her feel as though they were really worth something as men and women after all.

I am an overseer in a Northern mill, and must frankly admit that the Southern mills are advancing much more rapidly in the consideration of the needs of their help than are the mills of the North. In my daily intercourse with the help in my department, I find among the majority the feeling that the mill cares nothing about their daily existence, how they live, or, in fact, whether they live at all. Every day I talk with some hand who says in scornful tones, "What do the officials care about me after I leave the mill, and what do they care about me while I am here except for what I do." It is a pitiful story to hear, but we must admit that it is a fact. The mill management does not get into close relations with the help, and their attitude toward them is one of "I am bigger, better, and stronger than you; I do not care to associate with you in any way." I have talked with mill men who as overseers, in what I would term the old days, held the attitude that the help under them should be regarded as so many machines, and in their attitude toward them they used that feeling, and certainly expressed it. One man said that he never spoke to a hand in the mill or on the street; if it was necessary to issue an order to a hand he would write it and pass it to him. Such men feel that the least bit of civility, let alone politeness, would give the help the feeling that the boss was weak and they could ride over him. If overseers should establish such treatment in mills, it would not take long to drive all of our help away, but I think there are too many men who have this idea and carry it into effect, even today.

Forty years ago the help in New England mills was of a high type, in fact they were the best people in the community. I remember of hearing my grandmother tell of the girls who used to work in the cotton mills. They used to take their sewing or knitting to the mill and have plenty of spare time to work on it. The managers of the mills thought nothing of having their relatives working on speeders or at the loom. Today, the class of people who would rank with the help of those days, would consider it a disgrace to be employed in a mill. And I don't know as I blame them in one respect, and I think my meaning will be made clear when the following changes that have occurred are considered. I do not think it necessary to go back over forty years to find the American men and women in the mills. If conditions in a mill could be ideal, they must have been then. Quality came before quantity, speeds were low, and I feel safe in saying that the stock used say in 30's yarn then, we have to run into 50's now. Overseers had small departments, and were not pushed for production; hence, did not have to keep continually driving at every one to get off the required number of pounds per week.

Then came the first change in the cotton mill help. The local supply of American help did not fill the demand of the ever increasing spindle, and managers began to look elsewhere and of course had to go across the water. It fell upon the Irish to fill up the gap in the mills and it did not take long before they became skilled operatives. It would hardly be fair to say that the Irish were ignorant morally and intellectually, but they were an uneducated race of people who came to our shores and went to work in the mills. At this time no one can blame the Americans or natives of a mill center in leaving the mills and taking up other employment. I will not say that the Irish drove the American help out of the mills, but rather, that the Americans began to elevate themselves and go into higher and better conditions, or forms of employment. Nevertheless, a complete change had taken place in the help in the mills, and the first step backward had been made in the efficiency of the help, which made it harder for the overseer in two ways. His help had fallen from a high rate of intelligence and efficiency, and the mechanical conditions had taken a step toward higher speed and greater productions, and with the quality still held as high. The two essential elements in a mill were beginning to draw apart, and as time goes on, they are being separated more and more.

The French, mostly from Canada, next began to find their way into the mill centers and before long the Irish, who by this time began to call themselves Americans, many by naturalization and others by actual birth, began to leave the mills and go into other forms of employment that were considered higher, and more in keeping with the social plane to which the Irish had risen.

Another drop backward in the efficiency of the help and another demand for production and quality. Three distinct types of people that had to be educated and trained to a certain standard of skill in a very short period of years.

To the French, must be given the credit for being the best help as far as skill is concerned, that the mills have had, but morally and intellectually they are, as a class, a sad lot, and I for one do not want my sister working among such conditions, and I think I speak for all men who have any respect for decency, let alone purity. During the last five years the French have been gradually drifting out of the mills, and their places have been taken by Poles, Greeks, Assyrians and Italians. Another jump backward in efficiency of help and another demand for quality and quantity.

We have worked down to the present day, and present conditions confront us that are not being handled right. What solution can be given to the problem of handling help, which today is a manager's greatest trouble? It is easy enough to find fault with conditions, but unless one can give a remedy that can be applied to the wrong, and that wrong made right, then the fault finder is a stumbling block to progress. If men in the mills spent one-half

of the gray matter and time used in finding fault with conditions, and especially the management, and put that time to a study of how to better conditions, and then advanced their ideas, this world would be a better place to live in, and the inside of mills would be made brighter and cheerier because of their presence.

One trouble that overseers have to contend with is one that could be completely eliminated if the right pressure could be brought to bear on the higher powers in the mill. An overseer is in daily contact with the help, living with them and studying conditions that cannot be understood by any one else, and least of all, explained by figures. From my point of view, it appears as though the executive man, say the agent, deals wholly with figures, and does not take into consideration the practical or human side of the work. An overseer can get a hearing at the office if he can lay out some plan to save some money, but if he wishes to take up the sentimental side of the help question, he would, in most cases, get a short reply something after this fashion: "We hire you to run your room and expect you to look out for the help; we have other things to take up our mind." A discouraged overseer goes back into the mill and imparts that feeling to the help by his actions. An agent immediately inquires of the cost clerk to see how things are going in that overseer's department, and the next time the overseer looks in his box in the office he finds a letter saying that a certain number of yarn was spun for so much last month, and this half of it has cost so much more; that this matter must be attended to at once.

The agent does not go into the mill and confer with the overseer to see if the help question is giving him any trouble. I lay special stress on the help question, because that is the only thing that ought to down a good man. I may be getting away from my subject a little, but I do want to make an appeal for more harmony and good feeling between the office and the overseers. With the same common interest concerning both parties, there is too wide a gap between the office and the men on the job. The overseers have this help question to solve all alone in a great many cases, and I claim it is too large a burden for them to carry.

In my department I have seven nationalities, with about 50 per cent who can speak or understand "mill English." The two hundred heads in the department are human, but ignorant. How can we, as overseers, approach these men, women and children, and educate them so that they will take more interest in their work, and feel that they are a part of the whole organization and have some responsibility on their shoulders. I do not see any way for this to be done until we, as mill officials, begin to take more interest in the lives of the help, both in and out of the mill. One trouble is that we hate to come down to their level in any respect. How many overseers go to visit the help when they are sick? On the contrary, they tell some other member of the family that "if Sadie does not come in Monday morning, her frames will be given away." Yes, they know she is sick, but they have got to keep the frames running. Why? Because loss in production means a call from the office, and explanations are not accepted. Again it is made hard and the overseer is cast down. Six months ago I took two hands, studied their work, interested myself somewhat in their lives outside the mill and began to work up an interest in them. One was a drawing tender, a French boy seventeen years old. He was the dirtiest boy in the room, both bodily and about his work. I found out where he spent his evenings, and would mingle with him at every opportunity; this gave me something to talk to him about beside work. He took advantage of my friendly attitude at first, but after awhile he found that I still insisted upon his work being done, and his attitude changed to one of pleasure whenever I went near his frames. At least once a day I would stop and talk with him both on work and pleasure, and kept trying to impress upon him that he had a lot of responsibility on his shoulders. It took three months before I began to see that his clothes were cleaner, and that he kept the clearers picked and the floor swept up. One morning he asked me if he was not doing better, and that gave me my chance. I immediately promised him the first chance to learn to run combers, which to him meant more money and better work. I have a model hand in that boy now, and he does not need any more of the old sort of driving to get him to do his work. That is one way that has worked out to good advantage.

I should like to see the following plan tried, and believe it would serve as a stimulant to family help to take more interest in the work. For instance, there are several families who have three or four workers in the mill. They are paying, as they have to do in New England cities, from ten to fourteen dollars per month for rent, for which the only return they get is a house to live in. Let the mills build houses for these families, and let the rent go toward paying for the home. There is not a family in any mill but would take more interest in the home if they knew that in time they were going to own it. After that home is paid for, I feel sure that the family will not be so apt to move away to some other centre, but would encourage others to come where they were and live under the same plan. This idea may be somewhat in advance of present day methods, but it seems practical and worth trying.

I should like to have COTTON ask for other men's ideas on how to solve the help question, and I believe it is a good work to be interested in. Unless something is done by the mills to encourage good help to come into the mills, the near future looks very dark to me.

By good help I mean the English speaking classes who are now employed by department stores and other departments of labor that do not pay as good wages as the mills. To many people this statement will sound strange, but it is a fact that the average wage paid in the majority of New England mills is greater than the employees of department stores, as well as a great many forms of office work. The girl behind the ribbon counter in a large department store will be paid, say six dollars for fifty-four to fifty-eight hours per week, and on Saturdays from eight o'clock in the morning until ten o'clock at night. That same girl, were she so inclined, could go into the mill and earn from eight to twelve dollars per week with no work evenings, and on Saturday she is free at noon. Why won't such girls work in the mills today, and who is to blame? No one but the mill managers, who forty years ago began to lose personal interest in the help, and at present take no interest whatever.

I believe the mills could be made more attractive at a very small cost, and with the right kind of advertising that would explain to people what we have to offer, the right kind of help could be induced to come back into the mills. The average person blames the mill for the foreign element that is coming here, and I wish to close by showing where

the mill stands on the foreign help question. The mill help in England are of a much higher type than we have here. There is a surplus of help in England that wishes to come to this country, but cannot get the necessary money together to pay for their passage, and have thirty dollars when they land here, which I believe is the sum the government requires them to have before they can land.

We need this class of help, which, if allowed to come here, would be thrifty home makers and good citizens. This government will not allow us to assist these people to come here, either directly or indirectly, through their friends already here. Thus we are forced to take the unskilled and ignorant foreigners from other lands, who do not make good citizens, but stand ready to fight at the first wave of the Socialist's flag.

COST RECORDS.

BY CHARLES M. SEARS.*

For the past year or two, most cotton mills have been tempted to diversify their product to almost a reckless extent, not only to catch the little business offered, but to be ready for such larger demands as the returning tide of prosperity should make. The tide has turned and the spindles and looms can go back to a more regular schedule. In determining what fabrics are the best in every way for the mills future business, cost records that tell the truth, and all the truth, can be the manager's greatest friend.

There are other problems quite as vital within the mills themselves. The readjustment of wages, that has recently taken place, with a larger proportion of increase for day labor, will throw many cost formulas into confusion.

A very marked increase in cost between the various lengths of staple cottons, brings up questions of fundamental and far-reaching significance, such as speed, twist, waste and new machinery.

Our friends the overseers, need to have their old rule-of-thumb methods re-edited. The overseer is a vital element of manufacturing success. He must be trained to meet new conditions; have we facts, secured with scientific accuracy and simplicity, to concentrate the superintendent's and overseer's attention on the most vital points?

For the mastery of these problems it would seem an ideal worth trying for, to have at one's elbow an orderly and simple collection of facts,—facts that will give one a grasp of the possibilities and limitations of the mill organization.

All mill problems will sift down to a question of how they affect the cost of production. We will consider an average American cotton mill, equipped with looms and spinning. First the effort will be to determine the cost per pound of the various yarns and cost per yard of all subsequent processes. My basis for cost of yarn is the cost per spindle per day for general expense, carding and spinning.

The *general expense* cost includes the cost that is general for the entire plant, such as outside labor and supplies, power plant, office, salaries, insurance, interest, depreciation, etc. This may be divided into two parts, that directly under the mill manager and that controlled by the treasurer.

The *carding* cost is day labor and supplies, not frame hands who are paid by the hank.

The *spinning* cost is day labor and supplies and spinners, also if there is the same pay per spindle for all numbers of yarn spun.

These items for six months, divided by the number of spindles run and number of days run, will give a standard cost per spindle per day; then to determine the cost per pound of the various numbers of yarn for that much of the expense, divide by the various pounds per day per spindle.

To illustrate, take the carding for a 100,000 spindle mill, 150 days run—

	Total Cost.	Per Spindle per day.
Labor	$10,000	.06667 cents.
Supplies	5,000	.03333 cents.
Total.....	$15,000	.10000 cents.

If 35's was one of the yarns spun and the production per spindle per day was .19 pounds, the cost per pound in the card room would be:

Labor	.06667 cents	÷ .19	=	.351 cents.
Supplies	.03333 cents	÷ .19	=	.175 cents.
Total.....	.10000 cents	÷ .19	=	.526 cents.

This principle lends itself readily to a very graphic and flexible system of records that will vary, of course, to suit the needs of any mill. The reason for diverting so much of the cost by the spindle, is to place the proper burden of cost on the finer yarns. The average mill does not have a very wide range of numbers, but if there is a wide range, the character of the machinery and methods used, will divide the preparation into distinct units, which should be handled as separate plants. To further illustrate, suppose there are a certain number of spindles each on 28's and 35's yarns, and a change is made, putting half the 28's onto 40's. The total product would be lessened at once and the total cost per pound for general expense, carding and spinning increased, while the actual payroll cost per spindle, remained the same. All this increase will by the spindle method go where it belongs, as the cost per pound of each number is determined by the product per spindle. The cost of 28's and 35's would remain as before, while the increase in the cost would all go to the 40's. In estimating what the cost of 40's would have been before the change was made, it would be merely necessary to determine what the product per spindle would be under your own peculiar conditions.

In assembling the total cost per pound of the yarns, there is yet to consider the frame cost in the card room, which can be determined through the price paid per hank. The cost of spinners can be adjusted if necessary with reference to the variations due to local conditions.

Under this plan, as perhaps it would under any other, it is best to pay the spooling at so much per 100 spindles, varying the price for each number, so that the cost per spindle can be at once figured, and from that the cost per pound.

An interesting method of determining the cost of warping is to divide the total cost among the various numbers in proportion to the total number of hanks spun of each number, and then dividing those sums by the pounds run of each number, giving the cost per pound.

With the above figures assembled on a proper card, the cost per pound of the yarns made for six months can be shown.

*Read before the National Association of Cotton Manufacturers.

Under usual conditions the cost per yard in the slasher and cloth rooms is practically constant for all styles run. Drawing-in costs per yard are found by knowing the number of cuts on the loom beams, price and average yards per cut woven. In the weave room the weavers cost per yard is determined directly by the cost per cut. The fixers, day hands and supplies can be figured down to so much per loom, and this being divided by the product per loom of each fabric, the cost per yard is found.

The cost of cotton per yard is determined in this way,—if the warp and filling are made of different cost stocks, the percentage of each yarn in the cloth must be figured and from that figure the cotton cost in a pound of cloth; dividing by the yards per pound of the fabric will give the cost per yard. The per cent. of waste is apt to be rather carelessly applied. For instance, in many mills the high priced stock from which the best yarns are made, does not receive any roving or spinning wastes, so that quite a quantity of high price cotton goes into the lower grades. This loss should be charged to the high grade yarns, making the percentage of waste much higher than the average per cent. on the high grade and lower for the low grade yarns.

The total cost of any fabric run during the six months can now be determined. The cost per pound of the yarns being known, the cost per yard of the yarns in any cloth can be found in the same way as shown for the cotton in the cloth.

As a summary, a form is given below which I have found convenient for figuring the cost of any new fabric. Upon this sheet can be assembled all the figures necessary and it makes a good record for reference.

SAMPLE NO.

Manufacturing Cost.

	Warp	
	Warp	
Production, Hank		
Pounds		
Indirect Expense		
Carding, Day and Supplies		
Combing		
Slubbers		
Intermediates		
Fine Frames		
Jack Frames		
Spinning, Day and Supplies		
Job		
Spooling		
Warping		
Yarn, cost per pound		
Yarn in Cloth, per yard		
Slashing, per yard		
Drawing-in, per yard		
Weaving, Job, per yard		
Fixers, per yard		
Day, per yard		
Supplies, per yard		
Cloth Room, per yard		
Labor and General Expense		per yard

In its practical application this form is spread out to a height of about six inches, is printed upon a sheet 9x12 inches, ruled horizontally with six lines to the inch, and vertically three-eighths of an inch apart, the lower part of the page reserved blank for figuring. These separate sheets are punched so as to be held in a binder.

This method demands very accurate production statements from the spinning room. The warp is easily derived from the warper beams, but if there is ring filling, more difficulty is encountered. One method is to count the doffs of each yarn made with occasional, but regular, tests as to the weight of yarn in each doff; a check on this method can be made by some system of receipt in the weave room. Clocks can be used on the front rolls of the frame, as another method, with occasional but regular tests for the allowance to be made for ends down. I prefer this of the two methods for it opens up an interesting field for testing and experimenting. The spinning room is one fine station to determine the "reason why" with a considerable degree of accuracy; a few clocks on the warp frames is a good idea. Either method, however, is open to error and the human inclination to exaggerate (by "human" I mean the overseer), so a further check should be made in the office through analyzing the cloth product. The cloth product is accurate in weight and yards, but to allow for the increase or decrease of yarns in stock, careful "stock-in-process" reports should be made. The per cent. of sizing in the cloth is another important item and for many reasons, accurate tests should be regularly made.

Having these items: cloth products, stock-in-process at beginning and end of term, per centage of sizing in cloth, and per cents. of warp and filing in each fabric, a very accurate proof of the yarn product can be made.

I have made references to "occasional but regular" tests and reports. Many mills make occasional tests of one kind or another and base long years of effort upon them without repetition and prejudice, not real facts is the result. I advocate a system of occasional and regular tests with careful and graphic records, organized to suit the local conditions and adhered to strictly. For instance, to analyze the waste in the various processes, the results of new machinery or methods, the actual reasons why ends

.....191....

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Style;		
Order of		
Width	Weight	
Count		
Warp		per cent.
Filling		per cent.
No. of Harness		
Loom	Speed	
Yards per loom per day		per cent. run
Weaving price	per cut	yds.
Price of Cotton; Warp	Filling	
Cotton in Cloth per yd.		
Labor and Gen. Ex. per yd.		
Total Cost per yd.		

come down in the spinning and the per cent. due to each reason, the same in the weave room why the looms stop, why the machine shop is so busy, and the per cent. of moisture in starch and cotton. A cotton mill can be made a most inspiring and profitable adventure, or left to hum sleepily along. This scientific effort for truth and simplicity seems to me to be a characteristically American one and will prove, perhaps, the solution of many stringent conditions.

A system composed only of ideas and carefully ruled sheets of paper will not long run itself; in some of the larger corporations today such matters are placed in the hands of a regular man who gives it his entire attention and very wisely so. If he is a trained mill man, there is an unlimited field for usefulness, as truthful information is dependent upon a clear mind, free from interruption, prejudice, ignorance or selfish thoughts of "holding the job," that is apt to affect the regular officials and hands in the mill. The smaller mills need the same attendance either through a regular employee or the occasional visit of an

expert on the same principle that their books are regularly audited. Our financial records have developed from the old "memory and slate" system to the highly accurate and scientific simplicity of modern accounting; cotton and labor are money just as much as cheques and bank deposits and will profit by a similar approach.

STARTING UP FANCY DOBBY WARPS.

(*Contributed Exclusively to* COTTON).

BY PROF. THOMAS NELSON.

One of the most responsible positions among the productive labor in a fancy cotton mill is the loom fixer. He is the key to the successful operation of a fancy weave room. Take a good fixer off a set of fancy looms and replace him with a poor one and note the result.

Of course, the same thing can be said in regard to the weaver, in fact, in every kind of work in the mill. It is a well known fact that the poor weaver, the unsystematized weaver, the one who jumps about here and there, is the one who does not accomplish anything and who, in all probability, works the hardest. On the other hand, put a good weaver on these same looms and an immediate change is noticed. The warps weave better. Why? Simply system; attention to business; and looking after the little things. The writer cannot refrain at this point from stating that while he was working in the mill as a little fellow helping the weaver—a tenter as they were then called in England—how it was impressed upon him that one half the weaving was done *behind the loom*. A good weaver knows that if the large knots, slugs, etc., are cut off, tangles behind the lease rods prevented, and a few other little things attended to behind the loom, that the weaving is improved at least fifty per cent.

In starting out this article, the writer intended to try and help the good weaver who was looking forward to a promotion to a position as loom fixer. To be a good loom fixer, not a poor one, for a good weaver's ideal should be the good loom fixer.

We will now consider a few points in the starting up of a fancy warp. First, every good fixer always pays attention to the harness springs. The strongest springs should be on the heaviest harness, that is, the harness that has the most changes and carries the largest number of ends. The spring on each side of the harness should be of the same strength. If the spring on one side is stronger than the spring on the other side, the harness will be pulled down unevenly. If fine yarns are used, the ends will have a tendency to break on the side of the strong spring. Also, there will be a tendency for the ends to stitch on the side of the weak spring.

If the springs are too strong for the number of ends on the harness frame, there will always be the tendency to breakage on account of the strong pull on the ends. An experienced fixer will be able to determine immediately the proper strength of springs required for each harness shaft. A learner can readily "catch on" by a little careful observation. An experienced fixer can also tell by pulling on the springs just about the strength of each and will set them apart to be used according to strength, but the writer will describe a method to learners which is positive in determining the strength of each individual spring. Referring to Fig. 1, this represents an ordinary strip of wood 1 x 3 inches wide with a screw at the top and lines at the bottom which are numbered. One end of the spring is put on the screw and from the other end a weight is suspended. The weight will pull the spring down a certain distance and the end will be opposite one of the figures on the board. If one spring is pulled down to Number 1 and another spring to Number 8, Number 8 spring will of course be weaker than Number 1, and so on. The springs that are opposite a certain number are all put together and used in this way springs

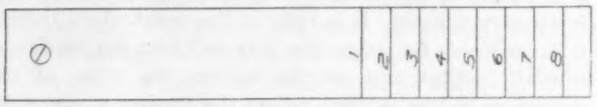


FIG. 1. A GAUGE FOR SPRINGS.

of equal strength will be obtained. It only remains to divide the springs according to the harness. The twine which connects the springs to the harness hooks in the shafts should all be the same length. The numbers on the board in the illustration can be increased according to variations in the strength of the springs. When the springs are attached to the harness shafts, the ends of the shafts should be in line. If they are not in line it will indicate that the springs are not pulling evenly on the shafts.

The difference between a spring jack and individual springs, is that in a spring jack all the springs are encased in a frame, each spring being attached to the end of a lever, the harness shaft being connected by twine or a harness strap to the opposite end of lever. The same principle of using the strongest and weakest springs for different harness applies equally in this case. The difference in obtaining the strength of springs is in the manner in which the springs are connected to the spring lever. Usually there are three points of connection, indicated by three notches on the lever. The notch nearest the fulcrum will give the weakest or easiest pull, with the notch farthest from the fulcrum giving the strongest pull. This regulation of the springs should always be made before starting up a warp, in fact, when the harness straps are being connected to the spring levers.

Now, it is a question as to which arrangement of springs give the best results, or rather, from which arrangement the best results are obtained. With the individual spring the most strain on each spring is when the harness is raised. At this point, when the shed is open, the most strain is on the yarn, so that the ideal arrangement would be to relieve the harness from a strong tension at this point. This, the individual spring does not do.

On the other hand, the arrangement of the springs in the spring jack will, when the harness is raised, bring the connection of the spring with the lever nearer the fulcrum of the lever, thereby relieving the tension. Using this as the only basis to decide which arrangement is the most advantageous, the spring jack arrangement would be considered the best. There are, however, one or two other points that are worthy of consideration. First: indivudual springs are easily connected to the harness; second, they are easily adjusted; third, selection of different strength springs is easily made; fourth, definite strength of springs are obtained so that if these springs were not used correctly, it would be absolute carelessness on the part of the fixer; fifth, springs of different strength can be separated and kept on hand by the fixer ready for a new warp.

In regard to spring jacks, the following points can be presented: First, the spring jacks are always in place under the loom; second, the connections between spring levers and harness are usually in position; third, the springs are connected to the spring lever and the connection between the spring lever and the harness is easily made; fourth, the regulation of the tension on the springs can be and is made when the spring lever has been connected to the harness shaft. This regulation is not as easily done as with individual springs, though with a little practice it is not very difficult. It is right at this point where trouble is experienced, for unless the fixer will take the trouble to carefully adjust and set the springs the value of the springs in so far as they relieve the tension on the yarn will not be of any advantage. This part of the work must be attended to or good results can scarcely be expected.

It can therefore be stated that individual preference is the guide to selecting either individual springs or the spring jacks. Whatever system is used, carefulness in the small things are essential to good work.

COTTON MILL MACHINERY CALCULATIONS.

(*Contributed Exclusively to* COTTON).

BY B. M. PARKER.

PART XV.

We have already found that the shape of the cones was such that, for each layer wound on the bobbin, the cone belt is moved an equal distance along the face of the cone, giving the correct decrease in bobbin speed and a uniform tension from start to finish of a set. The amount of this traverse would naturally be the length of the cone used, from start to finish of the set, divided by the number of layers put on the full bobbin. No rule can be given to determine the proper tension gear for different sizes of roving that will work under all conditions, as the tension depends largely upon the amount of twist in the roving and the lay of the roving on the bobbin. A change of atmospheric conditions will affect the tension, for roving that will run all right on a damp day may be too tight on a clear, dry day, necessitating a change of one or two teeth in the size of the tension gear.

The amount of twist in the roving also influences the tension to a certain extent, for, if the roving is hard twisted, its diameter is smaller and, consequently, the bobbin increases slower in diameter, necessitating a slower decrease in speed.

The size of the rail or lay gear, governing the speed at which the rail is traversed, thus determining the closeness of the coils in each layer, also has a tendency to affect the tension. If the lay gear is too large, the rail speed will be too fast and the coils would be more open, allowing the next layer of roving to draw down between the coils, therefore, the diameter of the bobbin would not increase as rapidly with each layer wound. This would require a slower decrease in bobbin speed and call for the use of a smaller tension gear than we would naturally expect.

From the above facts, the conditions governing the tension on the roving are seen to be of such a variable nature that the final judge of the correctness of the tension on the roving must be its appearance as the frame runs and the tension gear must be changed to suit the conditions regardless of how far from its calculated size we may have to vary.

Fig. 40 shows the plan of gearing on a 12 x 6 inch Saco-Pettee slubber. The upright, or tumbling shaft, carries a double threaded worm, driving into a 32-tooth worm gear. On the stud with this worm gear is a 60-tooth gear driving into a 50-tooth gear. On the stud with this gear is the tension gear, gearing direct into the cone rack. After the winding of each layer on the bobbin, the tumbling shaft is revolved ½ a revolution by the gear on the end of the top cone shaft. This causes the worm gear to move one tooth, thus moving the belt a certain distance on the cones, this distance depending upon the size of the tension gear.

If we assume the main shaft speed as 250 R. P. M., with a 56-tooth twist gear on and the frame to be running .64 H. R., then the top cone speed will be:

$$\frac{250 \times 56}{46} = 304.35 \text{ R. P. M.}$$

The belt starts on the top cone 2.75 inches from the end. The diameter of the top cone at this point is 6.75 inches, and the corresponding diameter of the bottom cone is 3.75 inches, giving a ratio between the two of 1.8. Then the bottom cone speed at the start is $304.35 \times 1.8 = 547.83$ R. P. M..

When the bobbin is full its diameter is 6 inches, and the belt has moved its full traverse on the cones. The diameter of the empty bobbin is 1⅞ or 1.875 inches, hence, the bottom cone speed at this point will be:

$$\frac{547.83 \times 1.875}{6} = 171.19 \text{ R. P. M.}$$

Knowing the top and bottom cone speed, we can find the top cone diameter by the following:

$$\frac{10.5 \times 171.19}{304.35 + 171.19} = 3.77 \text{ inches for the top cone diameter when the bobbin is 6 inches in diameter, or full.}$$

As the point on the top cone where the diameter is 3.77 inches is 28.5 inches from the point where the belt starts, then the belt and belt rack must move 28.5 inches while building a full bobbin. There are 32 teeth in 10 inches of rack or 3.2 teeth in every inch. Therefore, the rack must move $28.5 \times 3.2 = 91.2$ teeth in order to move the belt 28.5 inches.

There are eight coils per inch on the bobbin, ($\sqrt{.64} \times 100 = 8$), and as the layers per inch are four times the coils per inch, there will be 32 layers per inch on the bobbin. The diameter of the empty bobbin is 1⅞ inches, and the diameter of the full bobbin 6 inches, therefore, there is 4⅛ inches of roving put on the bobbin, or 2 1/16 inches on each side, to build it out to 6 inches in diameter. Then $2\ 1/16 \times 32 = 66$ layers of roving wound on the bobbin, which calls for 66 reversions of the rail and 66 movements of the cone-belt rack.

The tumbling shaft makes ½ a revolution for every reversion of the rail, or for every movement of the belt rack, then 33 revolutions of tumbling shaft will be required for the 66 reversions of the rail. Therefore, to wind on the 66 layers of roving, or to move the belt rack the 28.5

inches necessary, it will require 2.47 revolutions of the stud carrying the tension gear, as follows:

$$\frac{33 \times 2 \times 60}{32 \times 50} = 2.47.$$

As there is a total of 91.2 teeth used in the rack in traversing the belt, the necessary 28.5 inches, there will be required 37 teeth in the tension gear, as follows: $91.2 \div 2.47 = 36.9$ or 37 teeth. Then $\sqrt{.64} \times 37 = 29.6$ tension factor.

Rule for using tension factor: Factor $\div \sqrt{HR}$ = tension gear.

Referring again to Fig. 40: the bottom cone drives the take-up shaft, which, through a train of bevel and spur gears, drives the lay shaft carrying the lay gear. This gear is also called the traverse and rail gear. The lay gear, by a train of spur gears, drives the lifting shaft. On the lifting shaft is a 12-tooth pinion in gear with the lifting arm or segment that raises and lowers the rail.

As we found before, the bottom cone has a speed, at the start, of 547.83 R. P. M., then the speed of the take-up shaft will be:

$$\frac{547.83 \times 16}{48} = 182.61 \text{ R. P. M.}$$

By following the train of gears between the take-up shaft and the lay shaft, we get the speed of the lay shaft to be:

$$\frac{182.61 \times 18 \times 20 \times 30}{40 \times 70 \times 30} = 23.48 \text{ R. P. M.}$$

The above is the calculated speed of the lay shaft that would be present under the above conditions. The correct lay of the roving on the bobbin is based on the square root of the roving and, under ordinary conditions, will not be far from the results obtained from the following rule:

Coils per inch = square root of the H. R. × 100.

As we have assumed, in the calculation for the tension gear, that the frame is running on .64 H. R., the coils per inch will be: $\sqrt{.64} \times 100 = 8$, that is, 8 strands of .64 H. R. will lie in one inch of bobbin length.

The bobbin, when empty, is 1.875 inches in diameter, or 5.89 inches in circumference, then every coil on the bobbin will have 5.89 inches of roving in it and, as there are 8 coils per inch, the bobbin will wind up $5.89 \times 8 = 47.12$ inches of roving for every inch of rail traverse.

The speed of the front roll is found as follows:

$$\frac{250 \times 56 \times 71}{46 \times 130} = 166.25 \text{ R. P. M.}$$

The front roll is 1 3/16 inches in diameter or 3.73 inches in circumference, then: $166.25 \times 373 = 620.113$ inches of roving will be delivered by the front roll per minute. By dividing the delivery of the front roll per minute by the amount of roving wound on the bobbin per inch of traverse, we will get the speed at which the rail will have to move: $620.113 \div 47.12 = 13.18$ inches per minute.

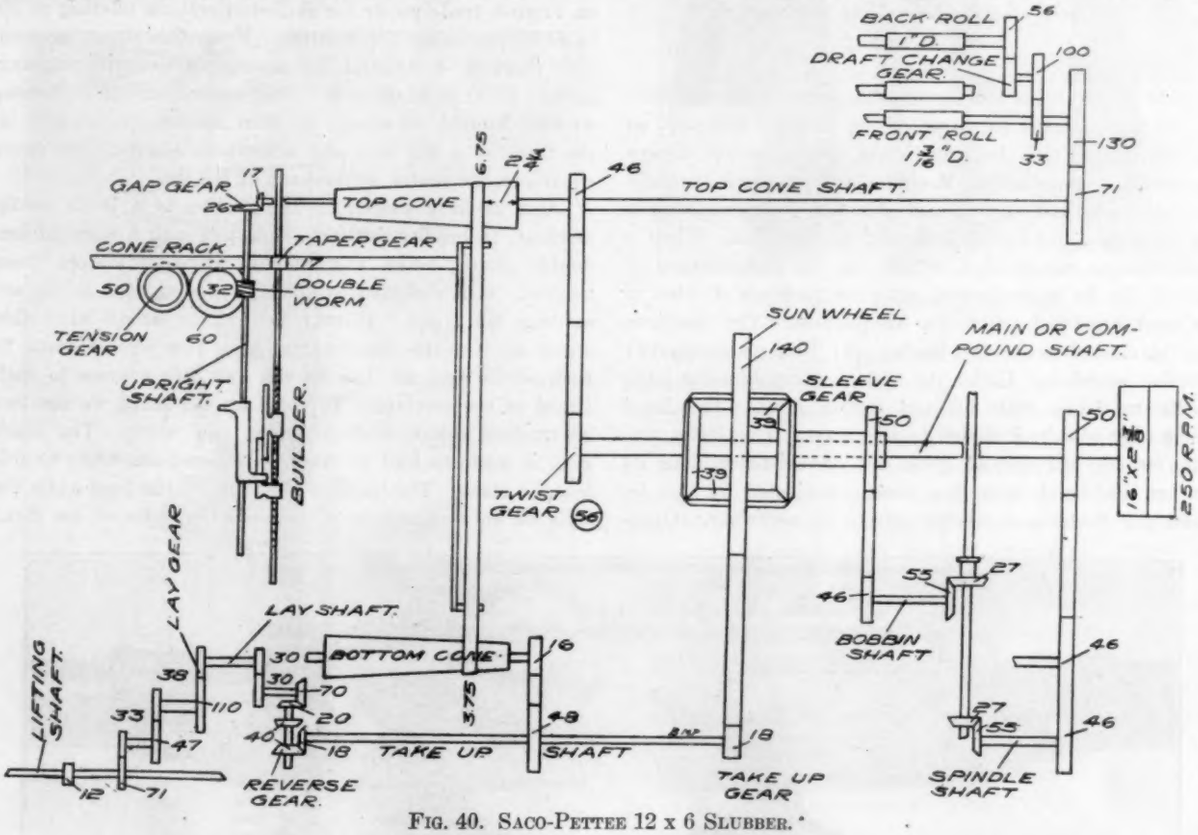


FIG. 40. SACO-PETTEE 12 x 6 SLUBBER.

The lifting gear has 12 teeth and moves the lifting arm 13.26 inches during a 12-inch traverse of rail. The teeth on the lifting arm are placed 10 in 6.5 inches or each tooth occupies a space of .65 inch, then $.65 \times 12 = 7.8$ inches which the lifting arm moves for every revolution of the lifting gear. As the lifting arm has to move a total of 13.26 inches for a full traverse of the rail, so $13.26 \div 7.8 = 1.7$ revolutions of lifting gear to a full 12-inch traverse of the bobbin rail.

Now, if the bobbin rail travels at the rate of 13.18 inches per minute and it takes 1.7 revolutions of the lifting gear

to traverse the rail 12 inches, then the speed of the lifting gear or shaft will be 1.86 R. P. M., as follows:

$$\frac{13.18}{12} \times 1.7 = 1.86 \text{ R. P. M.}$$

By following the train of gearing, we get the speed of the 110-tooth crown gear to be:

$$\frac{1.86 \times 71 \times 47}{33 \times 38} = 4.929 \text{ R. P. M.,}$$

and the total number of teeth used on the crown gear will be $4.929 \times 110 = 542.19$ teeth per minute.

As the lay gear drives this crown gear and we have found the speed of the lay shaft to be 23.48 R. P. M., we get the number of teeth in the lay gear as follows: $542.19 \div 23.48 =$ a 23-tooth lay gear. Then $\sqrt{.64} \times 23 = 18.4$ lay factor. Rule for using the lay factor: Factor $\div \sqrt{HR} =$ lay gear.

The following rule is useful in changing the hank roving on the frames and applies to both the lay and tension gears:

$\sqrt{H.R.\ on\ frame} \times gear\ on\ frame \div \sqrt{H.R.\ desired} = gear\ needed.$ It is understood that, in using this rule, there is no change to be made in the size of the roving on the back of the frame.

(To be Continued.)

KNITTING.

KNITTED NECKWEAR.

(Contributed Exclusively to COTTON*).*

BY H. K.

Just as surely as the sweater has worked its way into one of the standard garments of the knitting industry, so has the knitted tie. Its growth has been slow but always increasing in popularity. Machines are now built specially for this trade and any special ideas of the manufacturer can be carried out in the design of the machine. When a manufacturer has decided to take up the manufacture of knitted ties he is confronted with the problem of what is the most suitable machine for his purpose. The machines may be classed under two heads: (1) Flat machines, (2) Circular machines. Under the first class would come latch needle machines with inclined needle beds. The hand frame may also be included in this class. This latter machine which had almost gone out of existence, like its brother, the hand loom, has been resusticated by the demand for fancy and crochet effects in neckwear. Operators for these frames are by no means plentiful and it was noticed recently that a New York firm advertised in an English trade paper for skilled operators, offering $3.50 to $4.00 per dozen for knitting. From this it can be seen that there is a demand for a high priced tie retailing around $3.50 to $4.00 each. Ties knitted on flat machines, whether knitted on spring or latch needles, are knitted in the form of a flat web and afterwards seamed, this seam coming in the centre of the back of the tie.

Just recently placed on the market is a latch needle machine, 18 needles per inch, equipped with 8 yarn guides, double system cams, and racking attachment over three needles. It is designed to knit two ties at once in the accordeon rib stitch. It may be well to define what this stitch is. On this machine we have two sets of cams to each needle bed, so that we can knit two courses to each travel of the carriage. To show up the stitch we use two contrasting colors, such as black and white. The black yarn is made to lead at every course and the white to follow the black. The black to show up on the face while the white we only want to show between the wales of the ribs.

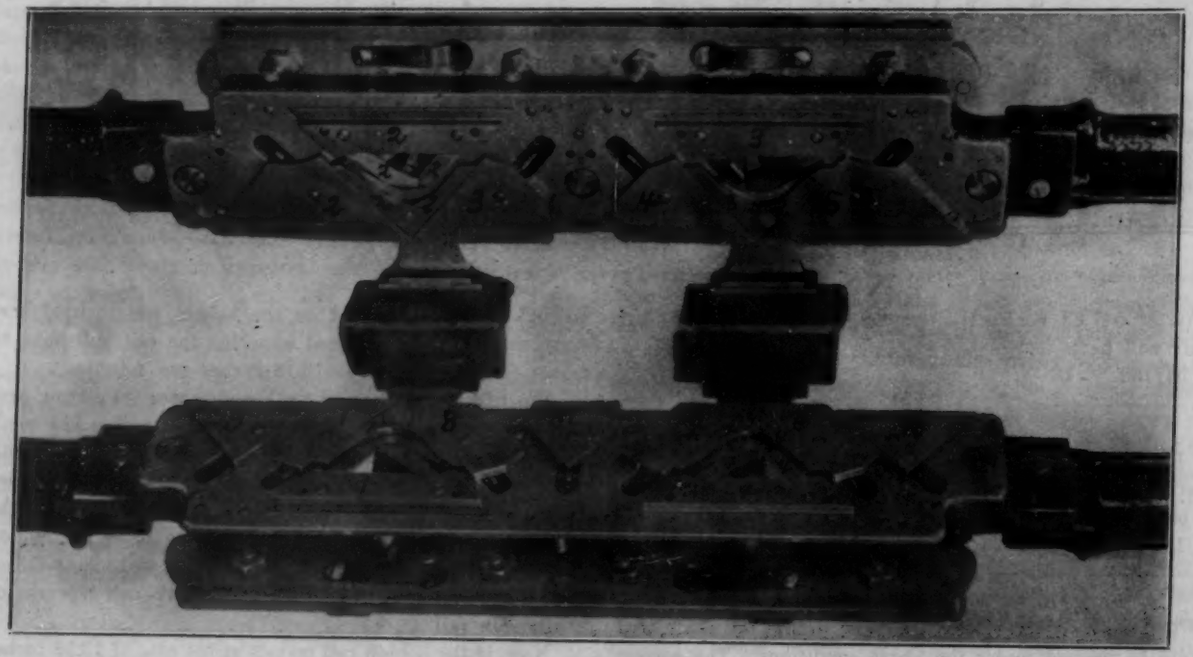


FIG. 1. SHOWING CAMS ON HAND MACHINE.

The cams are set so that the front needles and back needles knit with first set of cams, the second set of cams following, tuck on the front needles and knit on the back needles. This stitch if knitted in one solid color is the half-cardigan so well known to sweater manufacturers. The stitch on the back needles while knitting with the black yarn is set tighter than when knitting with the white yarn. The effect of this is to cover the black on the back of the fabric. The use of the half-cardigan stitch gives a more rigid fabric than by using the full cardigan stitch which if used would give a similar effect.

The cam arrangement, although complicated in appearance, is very simple. The cam stops are all numbered so that any particular cam can be located without any trouble. The wing cams are of the double type, and the additional wing cams are called helping cams. All four sets of cams can be raised out of action independently of each other. A view of the cams of this machine is shown in Fig. 1 and will give the reader an idea of the number of individual cams in each set. Being a hand machine, the production is small and ranges from 18 to 24 ties per day.

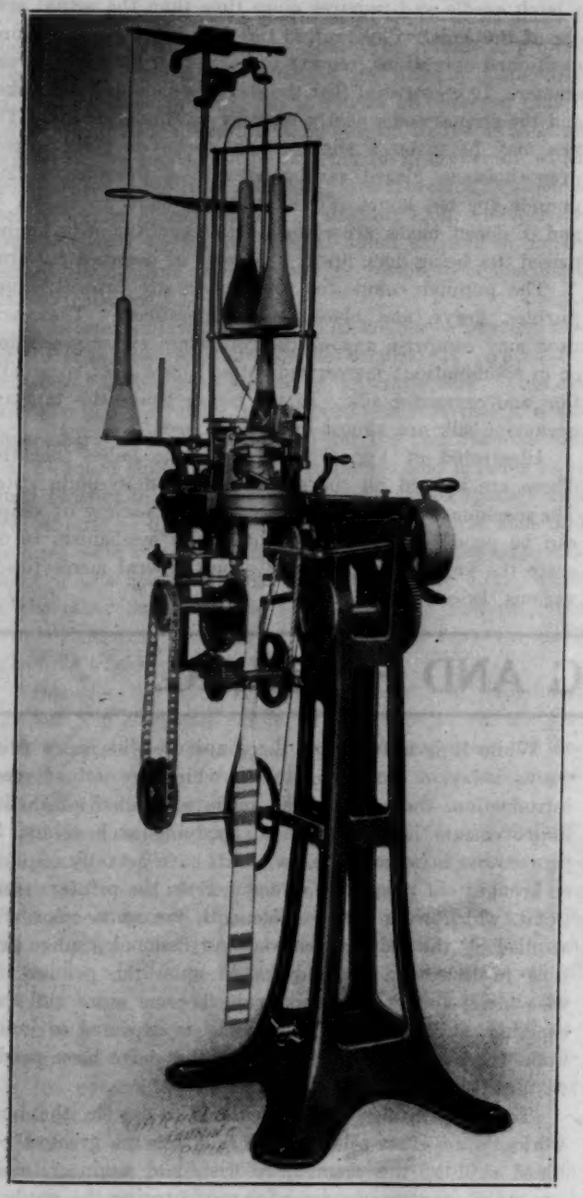


FIG. 2. CIRCULAR TIE MACHINE.

FIG. 3. LADIES' KNIT TIES.

For the neck part, plain rib stitch is used and made of one color. This change of stitch gives the desired narrowing of the fabric necessary for the neckband. The machine is also fitted with a dial clock which registers the number of courses knit. This allows the knitter to put the same number of courses in each tie, thus making them an uniform length. In the making of stripe effects this clock is also useful in making the required number of courses between each stripe.

The spring needle machines are made in finer gauges than latch needle machines and a larger range of fancy effects can be produced with the use of supplementary mechanisms. These mechanisms are known to the frame knitters as Bottom, Top, and Pelering machines. A brief description of these willl show for what purposes they are used. The bottom machine is provided with a number of thread layer guides, which are used to lay a number of threads, each over a certain number of needles at every course to produce vertical stripes, zig-zags, spots, etc. The top machine consists of a number of points at such intervals as may be required according to the pattern to be produced. These points transfer the loops from the needles to adjoining needles, leaving a number of empty needles which form small eyelet holes. The position of these holes forming the pattern. The pelering machine works similar to the top machine, only instead of transferring the loop which is on the needles, the points take the previously formed loop. In this way a pattern of slightly raised spotted effects are produced. A tuck presser may also be used on the hand frame and is used to produce raised effects.

The second class of machine used for knitted ties and

which has met with a great demand because of its simplicity and smoothness of running is the circular machine, 1¾ to 2½ inches in diameter, and fitted with latch needles. These machines are built to make all kinds of tubular ties, including plain stitch, tuck stitch, horizontal, vertical, and spiral stripes, and fancy effects. A popular size of machine is 49 needles with a cylinder diameter of 1¾ inches. The production varies according to the pattern, on single feed pattern an average of 8½ dozen is obtained and on double feed machines a production of 17 dozen can be produced. Each tie is completed on the machine, narrowing automatically at the neckband and by changing from a tuck stitch to a plain stitch without any attention of the operator.

Plain and tuck stitch patterns are made without the use

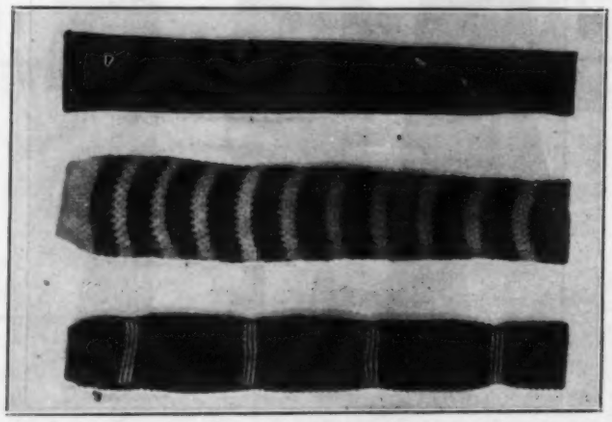


FIG. 4. KNIT TIES FOR MEN.

of pattern wheels, but most other patterns are made by the use of pattern wheels, and these wheels can be changed without any loss of time.

An imitation accordeon rib is made on a machine having a cylinder containing 100 needles, the cylinder being fitted with a long butt and a short butt needle alternating. On one feed the short butt needles are held down and only the long butt needles take the stitch. On the other feed all the needles take a stitch. Two colors are used so that the fabric has the appearance of a rib stitch similar to the accordeon rib stitch.

The accordeon tie can also be made on a circular machine in which dial and cylinder needles are used. A 2½-inch diameter cylinder is used with 100 needles in the cylinder and 100 in the dial. The yarn guides and cams are changed automatically so that the neckband can be made of one color in plain rib stitch. Additional patterns can be made on this machine by additional mechanism which can be added to the machine. Spots, vertical stripes and various other effects can be produced on the rib stitch. The power required to run these machines is small, eight machines can be run with one horse power. An illustration of a circular tie machine is shown in Fig. 2.

Bat or hobble ties are made by stopping the tucking at intervals when knitting the body of the tie. The finishing of the ties after they leave the knitter, which in the case of circular knit ties, is the sewing of the ends so that they will not unravel. This sewing is done on a three thread overseaming machine. The ends of the threads are now drawn in to the inside of the fabric. This is done by using a latch needle and requires more time than the actual sewing of the ends. Flat knitted ties in addition to the aforementioned operations, require to be seamed on a two thread seamer. It is essential that the selvages should be unbroken and the stripes come neatly together in this operation. The ties may be given a slight steam press, or given a cold press between glazed cardboard with a pressure of 200 pounds for ten hours. These ties are done up in ¼, ½ and 1 dozen boxes according to the quality. The higher priced ties being done up in ¼ dozens of assorted patterns.

The popular colors for this season are browns, blues, purples, grays, and black and white effects. The yarns used may comprise any of the following, either separately or in combination: mercerized cotton; fibre silk; spun silk; tam and organzine silk. In the higher grade ties tam and organzine silk are almost exclusively used.

Illustrated at Fig. 3 is shown some ladies' neckties. These are knitted all the same width and in plain stitch. The machine being an eight feed a great variety of stripes can be produced without requiring any mechanism to operate the yarn guides. Fig. 4 shows several men's ties in various styles.

DYEING, BLEACHING AND FINISHING.

THE PRINTING OF COTTON PIECE GOODS.

(Contributed Exclusively to COTTON.)

BY DR. LOUIS J. MATOS, CHEMICAL ENGINEER.

FIRST PAPER.

The progress of textile prints from a chemical or colorists standpoint, like the progress of dyeing, is to be measured by the progress made in the field of color chemistry and to the value, from the printers conception of the various colors and processes for printing. During the past few years, there have been brought to commercial importance a considerable number of colors that are of direct use to the calico printer, and which have been instrumental in bringing out a variety of styles that were remarkable for their practical utility, aside from their artistic features.

While it is a fact that there are used in many printworks today, a number of colors which are not of recent introduction, there have been made a number of distinct improvements in the mode of applying such colors, improvements in some instances which have actually imparted or brought out properties of value from the printers standpoint, which were not possible with the same color when applied by the older processes. As fashions change from time to time, the demands made upon the printer likewise alter, and as a general rule, become more and more exacting, and especially so when he is expected to imitate upon the printing machine, effects that have been produced directly upon the loom.

Textile printing as carried out to-day in the larger works, is an exact science, and calls for the greatest combined skill of the chemist, colorist, and engineer, and is expended over every stage of manufacturing the goods, al-

most from the spinning frame to the final rolling, not the least of which is the bleaching or preparing the goods for printing

Cotton cloth bleaching has for its object the removal from the cloth of the accidental and mechanical impurities, such as floor dirt, grease or oil spots, sizing, etc., and also the complete solution and permanent removal from the cotton fibres of the natural coloring matter, waxes and resins or oily matters belonging to it,—constituting essentially the bleaching process proper. The several processes follow each other in regular order, and where the single boiling process is used about as follows: Singeing; steeping; washing, saturating the goods and filling the kier; boiling in caustic lye and washing in the kier; washing and chemicing; souring, washing and squeezing. The double boiling process differs but slightly from the former and is as follows: Singeing; liming; boiling; washing and souring; again washing and filling in the soda kier; second boiling; washing and chemicing; finally souring, washing and squeezing.

The method to adopt depends upon the lay-out of the plant, and is governed also by the kind and grade of goods made, and further by the character of finish to be given to the fabrics. The quality of the white which any print cloth should have is controlled by the price and character of pattern to be printed, but it should be observed that in no case ought the bleaching to be carried so far as to cause injury to the goods, the most common instances of which being traced directly to so-called "overbleaching," which is merely a form of carelessness in allowing cloth which is impregnated with bleach liquor to lie about exposed to the action of the air, and which causes the cotton to be converted into oxycellulose.

Whenever scouring is required in the bleach process, better after-results will always be secured if hydrocloric (muriatic) acid is used instead of sulphuric acid. This has been mentioned so often by different chemists that it seems unnecessary to allude to it here, but the fact remains that lime-bleached cloth soured with sulphuric acid is liable to be much harsher to the feel than the same goods treated with hydrochloric acid, for the reason that sulphuric acid and the lime salts remaining in the cloth, form insoluable sulphate of line which adheres tenaciously to the fibres, while on the other hand, the use of hydrochloric acid produces soluble lime salts which are easily removed from the cloth by simple washing.

Whenever the cloth has been bleached, all remaining traces of the chemicals employed should be as far as possible, completely removed, so that when the pieces are delivered to the printer, they should be free from such impurities as will have action on the colors used.

The application of what are technically termed "colors" (which may be either thickened solutions of dyestuffs, discharge pastes, or other chemicals suitably thickened), depends almost entirely upon the correct choice of a suitable thickening agent, and experience demonstrates that no one of these agents is best for all purposes, while some are of no value when used alone—their good qualities being apparent only when combined with a thickening agent of another group. The following list comprises those most suitable for general use, and does not include any patented manufactured products:

Starch is the most important substance used in the preparation of print pastes. There are many varieties of starch but those most used are from wheat, corn, potatoes and rice. From whatever source, starch occurs in minute granules, and in bulk, appears as a white glistening mass or powder according to the method of preparation and drying, and possessing a characteristic "feel."

The most important property of any starch is its ability to absorb great quantities of water with a corresponding swelling-up and bursting of the granules and with a consequent formation of thin "starch paste," and which takes place a temperature of about 140 degrees F. The identification of a starch is only possible by the aid of the microscope which will show at once the characteristic form of the granules which are definite for each variety of starch

From the color-mixers standpoint, the starches named cannot be used to substitute each other entirely, and a selection must be made to meet requirements.

Wheat starch paste possesses strong thickening power, and is most largely used for paste making, the print colors made with it have the power of penetrating the goods.

Corn starch is well adapted for thickening alkaline print and discharge colors, and while its thickening power is greater than that of wheat starch, it does not keep as well.

Rice starch is chiefly used for finishing, although it has advantages for the printing of flannellettes. It is regarded as the purest of all the commercial starches.

Potato starch finds its greatest use as a finishing agent, but it is also used for color thickening.

In purchasing starch in bulk, it should be borne in mind that a good air-dried sample should contain about 15 per cent of moisture, remembering at the same time that starch is capable of retaining as much as 33 per cent of moisture without it being noticeable except upon analysis. Wheat flour is extensively used as a thickener for colors, but it does not work as well as starch. It is almost exclusively used in this country for tapestry carpet yarn printing.

DEXTRINE—BRITISH GUM.

Considerable confusion exists as to the identity of the products designated by the above names. Broadly, they are starches which have been treated by heat or acids in such a way as to render them soluble in water. These products do not have the thickening power of the starches, but are used for the purpose of giving smoothness to the starch paste. Strictly, dextrine is the result of treating potato starch with dilute acid, and is found in commerce both white and yellow. The former containing a large proportion of unchanged starch, while the latter contains very little.

So called "burned starch" is starch which has been roasted in an oven, and in commerce ranges in shade from a pale yellow to almost a brown. Its quality depends upon its color and thickening power. "British Gum" is roasted corn starch and is of a light brown color. It is much used for chlorate and caustic alkaline discharges. "Leiogomme" is roasted potato starch, and is well adapted for strong caustic alkaline discharges.

Another class of thickening agents are the gums, the most important of which is gum tragacanth, called also gum dragon; it is exported from Asia in the form of thin shell or leaflike strips, ranging from white to pale yellow. It has from two to three times the thickening power of starch and for this reason is used to impart body to starch pastes. It is seldom used alone except for printing heavy shades, and never for fine outline work. It does not dissolve in cold water, but simply swells up. Gum Arabic is a valuable thickener, but on account of its price is used sparingly.

Blood albumen is much used, chiefly as a fixing agent for pigments, and in the application of certain other classes of colors. It occurs in scales of a light yellow to brownish color, soluble in water at 100 degrees F. but coagulating at 160 degrees F., while mineral acids "cut" it in the cold. The pale grades should be used exclusively in printing tints and light colors. Egg albumen, though higher in price is used for very pale tints, while its thickening power is less.

Glue is sometimes used as an aid in thickening, and reference to its use will be made in the practical recipes to follow. Light colored transparent grades should alone be employed.

The preparation of thickenings implies the use of suitable apparatus, and without which no well equipped color shop can be complete. The most important apparatus being suitable soaking and boiling vats, straining sieves operated by power, launders, not to mention a battery of color solution pans heated by steam.

For the preparation of starch thickenings, the starch is made into a paste with a small amount of cold water, the remainder of the water added, and the whole gradually brought to the boil and boiled for 20 minutes. Prolonged boiling must be avoided as the starch will become thinner, and lose its body. During boiling, stirring must never be omitted. Thickenings made with gums require only the mixing of the proper amount of gum and water and gradually bring to the boil. In the case of gum tragacanth, however, this product should be soaked at least 48 hours in the proportion of about 6½ pounds of gum to 10 gallons of water, after which it is boiled for several hours with slow stirring until a smooth paste is obtained. In the case of the albumens this solution is prepared by taking one part of albumen and one or two parts of water to 90 degrees F. and allowing to stand for 24 hours, then strain to remove undissolved particles. As albumen decomposes more readily than other pastes, it is always necessary to add a small quantity of glycerine (or arseniated glycerine) to preserve it.

The following recipes are all from practice, and the gallon indicated is the standard U. S. gallon of eight pints, or 128 fluid ounces:

STARCH-TRAGACANTH THICKENINGS.

No. 1.

Wheat starch	10 pounds
Water	4¼ gallons
Tragacanth paste (65 to 1000)	55 pounds

No. 2.

Wheat starch	11½ pounds
Water	8½ gallons
Tragecanth paste	10 pounds
Acetic acid, 8 degrees Tw	1 gallon

No. 3.

Wheat starch	11 pounds
Water	8 gallons
Tragacanth paste	20 pounds
Olive Oil	3 pints

No. 4.

Wheat starch	10 pounds
Water	7 gallons
Tragacanth paste	29 pounds
Acetic acid	9 pints
Olive oil	1 quart

No. 5.

Wheat starch	12 pounds
Water	8 gallons
Tragacanth paste	12 pounds
Acetic acid	1 gallon
Olive oil	1½ pints

TRAGACANTH THICKENING—65 TO 1000.

Gum tragacanth	15 pounds
Water	30 gallons
Corrosive sublimate	1 ounce

The tragacanth is soaked for two days in the water, then the mass is boiled for several hours, replacing the water lost by evaporation, then add the sublimate previously dissolved in water.

GUM THICKENING 1 TO 1.

Gum arabic	10 pounds
Water	5 quarts

FLOUR-TRAGACANTH THICKENING.

Wheat flour	20 pounds
Water	6 gallons
Tragacanth paste	30 pounds

DEXTRINE (ALSO BRITISH GUM) THICKENING. 1 TO 1.

Gum	10 pounds
Water	5 quarts

ALBUMEN SOLUTION 1 TO 1.

Albumen (blood or egg)	10 pounds
Water at 90 degrees F	5 quarts

Other formula for thickeners of less frequent use than these now given, will be inserted under the proper color recipes as they appear in the articles to follow.

EQUIPMENT AND TESTING FOR UNIFORM SIZING.

BY LEONARD W. CRONKHITE.*

A large cotton mill investigated the supposedly uniform work of its sizing department. On goods of the same specifications, the percentage of size added to the yarn was found to range from 6 to 11 per cent. In another mill where similar work running in two slasher rooms was tested for weight it was found that one room was putting on 7 per cent. and the other 12 per cent. of size. Two slashers side by side, using size from the same kettle and sizing the same sort of warps for identically the same weaves, varied from 3 to 5 per cent. in the amount of size added. Variations from hour to hour on the same slasher have been noted; and it is common mill experience that the first run in the morning is liable to give light warps, and the first run in the afternoon to give either light or extra heavy sized warps according to the custom followed during the noon stop.

In some mills the kettle room is like a clean kitchen, in others it is a place where apparently anything will do. Cooking size uniformly is so far from being a crude task that the equipment should be so good as to be an incentive to the operatives toward cleanliness and attention to details. Considering how easily the consistency of starch either in its manufacture or in its use is affected by slight chemical disturbances, the degree of cleanliness usually exercised in the kettle room is insufficient. Any size left in the kettles to harden and cause rust or corrosion is some day going to cause a change in a mixing. Kettles and agi-

* Read before the National Association of Cotton Manufacturers.

tators need frequent scraping, flushing, and cleansing to insure uniform results in the first stage of the sizing process. If the kettle room is arranged properly, there will be little temptation to accumulate size sweepings, dirt, and hardened size to dump into the boiling mixings to lower the quality of the size. Good starch bins are a small but paying investment. The best bins are those built overhead, at the bottom of which the starch is easily on tap. Metal pans or flooring at the base of the kettles take care of overflows and are easily cleaned.

Some mills use tubs in which to stir the dry starch into water in order that it may be strained through a sieve on its way into the boiling kettle. The condition of some starches make this a wise precaution. The breakage on the slasher due to the presence of chips, insoluble lumps, and other foreign matter has in some cases been found to be considerable.

The size kettle is worthy of careful study. The kettle ought, of course, to be made of noncorrosive metal. The occurrence of runs of rust spots and stains, due in part to improper cleaning, is generally to be laid to the character of the kettle or its fittings. The chemical action of caked and putrifying size on a susceptible metal is rapid, thins the size, and causes staining. Iron kettles are a costly economy. Tinned or galvanized iron is better, but copper is better yet. The use of wood for kettles is as a rule to be condemned. The shape of the wood vat is usually wrong, the corners of wooden vats making proper agitation impossible, and inviting the caking of size. A kettle ought to be fitted with tight covers. Often mill operatives are found boiling one kettle with the cover up and another with the cover down. The difference in thinning of the mixings from condensation or evaporation is a factor. The rough and ready method of testing size in the kettle by letting some of the mixture run off the end of a stirring paddle does not show up variations in viscosity from such causes, but they nevertheless affect the weaving quality of a warp.

Any kettle ought to be fitted with agitators that agitate. The usual two-paddle one-way agitator is defective. It generally revolves the size instead of thoroughly mixing it. Relatively few mills can stir the mixture into a perfect starch before they boil the size. The result is that the starch paste is not absolutely homogeneous and free from little globules of partly cooked starch that later appear at the squeeze rolls. Sets of agitator arms moving in opposite directions give a mixture of uniform consistency, break up the lumps, bring every part of the mixture into contact with the maximum heat, and lessen the accumulation of cakes of size on any part of the kettle or agitator arms.

The method of heating the mixture in the kettle is important and intimately affects the uniformity of the results. Small jacketed kettles considerably used in foreign plants constitute the only proper arrangement, certainly for small plants. The jacketed kettle does away with the disturbing factor of condensation. In some mills, getting dry steam seems to be a problem; thinning of the mixture as much as 15 per cent. has been observed. If steam is injected directly into the mixture every possible precaution ought to be taken to deliver dry steam. Every mill needs kettles enough to be able if necessary to boil up different mixings for different goods. Yet many mills for lack of an extra kettle or two are seriously limiting the proper special treatment of thousands of pounds of cotton in the relatively inexpensive sizing process preparatory to the expensive process of weaving. In some cases resort is had to either adding water to the size in the boxes or stirring in cold starch to get the right consistency for a special run of work on one of two or more slashers. It is impossible to do uniform work in this way. Even in a small mill where more than one kettle may seem unnecessary, resort to this rule of thumb method ought to be avoided by having an extra kettle.

A similar limitation often exists because of incomplete piping from the various kettles to the various slashers. It means only a small outlay on extra piping and valves, to connect every kettle with every slasher, so that any kind of mixing desired can be run on the special work of any slasher. The piping ought to be of copper or brass and of ample size. Any kind of iron piping means a run of spots at some time or other. There should be no sharp angles to hinder the flow of size and strain the pumps; all changes of direction should be in wide curves. The branch pipes leading from the main piping system to each slasher should be as large and short as possible, and readily detachable for special cleaning.

It is practically impossible to size uniformly with a gravity system of conveyance from kettles to size boxes. In any gravity system the size has time to cool and gelatinize in some section of piping. If this cold size sticks and has to be blown out by steam, the result is a run of thinned size. Before the jelly lumps that blow out can be boiled up, they are likely to form hard spots on the yarn. A strong pumping system avoids some of these troubles.

No pumping system, however, is complete unless the piping admits of constant circulation of the size from the kettles through the pipes past each slasher tap, and back again to the kettles. This is absolutely essential to uniform work. The size is at all stages hot and is delivered at a uniform viscosity. A refinement found in a few mills is an arrangement of the piping by which all size left in the size boxes at noon and night can be pumped back to the kettles, leaving the boxes empty to be flushed and cleaned.

Many mills having no such arrangement leave size in the boxes overnight. It would be a saving in weaving expense to throw this size away rather than leave it. The skin that forms in contact with the air is almost impossible of solution again, the water used to flush and soften the rolls thins the mixture, the steam jets become clogged, and the mixture itself cooked a second time is never quite right again. The perfect way is to gauge the size needed for each day and make fresh batches every morning. Size that is boiled up a second time is not as efficient as size that is applied direct from the first cooking. Re-boiling impairs the adhesiveness, a fact that doubtless explains the feeling of some operatives that letting size stand over night makes it smoother in feel in the morning. Where size must be left overnight, mixing it with a freshly prepared and heavier mixing in the morning is the best expedient.

The ordinary size box is an added source of difficulty in getting uniform work. The box of course should be of nonrusting material. Occasionally a case comes to light where the box and all the fittings are of brass or copper save perhaps one little elbow, and to the action of hardened size on that one spot have been traced runs of rust spots. The use of steam jets in the size box is a source of trouble. The steam thins the size. The steam pipes get clogged. The boiling is often too violent, and causes hard spots when the size strikes the yarn after it has passed the squeeze

rolls. The extreme heat further cakes any size already cooled in the corners of the box. The size is not easily kept at a uniform heat. The best remedy for these difficulties is the cornerless double bottomed box, the upper or size box of which is heated by hot water in the lower compartment. This scheme is in considerable use in foreign mills.

No more important factor operates for or against uniform sizing than the height of the size in the box relative to the squeeze rolls. Regulation of this is generally left to the vigilance of the slasher tender, but should be automatic. This keeps the size at a constant level and at a practically constant heat. It is not merely the depth of the depression roll in the size that determines the amount of size added to the yarn, but also the dip of the squeeze rolls into the size, since this determines the amount of size taken up by the lower rolls to the point where the upper and lower squeeze rolls meet the yarn. The weight and condition of the squeeze rolls can greatly influence the amount of size taken up by the yarn, and to some extent the way in which the size will be distributed through the yarn. Too careful attention to the condition and lapping of the cloth on the rolls cannot be given, streaks and badly sized spots readily being caused by poor rolls.

When a slasher is used for sizing and drying a number of different styles in turn, care should always be taken to regulate the heat so that a light sheet will be delivered on the weaver's beam with as much of the necessary moisture in the starch and the cotton as would be retained in a heavy sheet. An apparently minor cause can greatly vary the quality especially of close weaves, and that is the rolling and crossing of ends as they wind on to the weaver's beam. A simple patent device worthy of notice consists of a straight comb and another off-set comb, the teeth of which are inclined; the bent comb forces the ends in each dent of the straight comb to reach the front roll side by side in the order originally intended.

In any mill frequent tests of the uniformity and quality of the work done by the sizing department ought to be made. Wherever practicable, there ought to be an established table of standard percentages of size needed on each kind of warp for the various weaves. The weights of at least several beams in each style ought to be taken each day, and the resultant percentage of size calculated. In such calculations, naturally only the actual average count of the yarn ought to be used. Records of this kind once figured and established as part of the routine, cost almost nothing and show up trouble at its source.

Where the same sizing materials are used day after day in fixed formulas, a very fair laboratory test for uniformity of materials can be made in the mill right at the machines by means of an ordinary Twaddell hydrometer, used in conjunction with a thermometer to get readings at a given temperature. The habit of going by certain standard readings for each formula will check up variations and is easy for any operative. Purchasing departments ought so far as feasible to buy all sizing materials on specification, paying for quality. In the case of starch specifying a maximum limit for the moisture content, a limit for the impurities, a condition as to alkalinity or acidity, and where the degree of progress of the starch manufacturer admits, a fixed viscosity, with understood penalties and procedure for deviations from standard. Any good textile laboratory can check up these points on shipments. Every firm with a really good product welcomes this kind of test and purchase.

New products should be tried only after a chemical test showing them to be at least harmless and indicating some probability of their usefulness. In the case of new sizing products every chemist is willing to hear the seller's interpretation of the chemical analysis he reports to a mill, before having a mill man pass final judgment on the article. A chemical test often shows that the cheapest place to buy water is at the mill faucet, and the cost of the information is less by the sheet than by the barrel. An analysis of a list of tallow, tallow substitutes and adhesive sizes to add to starch, shows eye-opening results. Some are all right, but some are built on recognizing that almost anything harmless can pass the sort of test made in some mills.

A real comparative mill test of the value of two sizing materials, if the type of equipment used is imperfect, should start with careful allowance for all the possible unequal factors that incompleteness of the equipment can cause in sizing two sets of warps for the comparison. The raw starches and other ingredients should be weighed, not measured, since their physical forms may differ enough to make given measures unequal in weight. A record of the two sets of formulas employed and of percentages of size added should be kept, and the size weights compared with the cloth weights after filling weights are deducted. While great weight added and retained may not be desired, the figures will show just how much size is giving the two weaving results, and how much is retained despite the chafing in the loom. If possible, specially weighed lots of filling off the same doff ought to be used in weaving the warps to be compared.

The weave test is the test, but it is often here that the least care is taken in getting at the actual facts. Detailed tests run on two sets of looms under ideal conditions showed differences in production up to 4 per cent. that were invisible to the operatives. Often a greater percentage might pass notice. The safe way is to pick certain looms and have an exact record of breakages made over a definite period. This record in conjunction with an exact record of cloth taken off the looms between definite periods measured for each loom will show comparisons that can be relied on. If tests are worth running at all, they are worth this degree of care.

NOTES ON DYEING, BLEACHING AND FINISHING.

The Newest and Latest Chemical Facts From the Laboratories of the World. Prepared for and Contributed Exclusively to "Cotton."

BY J. MERRITT MATTHEWS, PH. D.

New Methods of Water Softening.

The softening of water for industrial purposes has always been a fruitful field for exploitation for the commercial chemist. We are continually confronted with new "boiler-compounds" and preparations which claim to give water new and distinctive properties peculiarly beneficial in dyeing, bleaching, and scouring.

Recently there have been put forward two new methods for the softening and purification of water for industrial purposes, the claims for which are rather unique; and if these methods yielded results fully realizing their claims they would prove of sufficient moment to excite general interest.

The first method is of German origin, and depends on the use of a peculiar substance known as *permutite*. This is an artificially prepared mineral substance, consisting essentially of aluminum silicate in combination with soda and potash. The water to be softened is brought in contact with this substance in a suitable filtering apparatus, whereon the lime, magnesium, and iron compounds in the raw water are taken up by the permutite, replacing the soda and potash in this compound. The peculiarity of the permutite, however, lies in the fact that its softening property may easily be regenerated by treatment with a solution of common salt, and hence the permutite filter may be used almost indefinitely.

That this method of water softening is not a wild-cat scheme is proved by the fact that a large number of plants are now in successful operation in Germany and England, and it has now had sufficient use to admit of careful and practical study. Whether this method possesses features which recommend it over the older and more usual method of the alum filter is yet to be proven. It appears that while the permutite filter can be so operated as to abstract practically all of the lime, magnesium and iron salts from the treated water, still it leaves the water rich in soda salts, giving practically the same results as the ordinary soda treatment for the softening of boiler-feed water. Another disadvantage of the process is that the raw water must not possess an acid reaction and also must not contain suspended matter. Such a water passing through the permutite filter rapidly coats the permutite with inert matter which interferes with its chemical activity in softening the water. The permutite process must really be regarded as a distinctly softening operation rather than a filtering process proper, and for its successful application it requires a preliminary filtration of the water to remove all suspended matter. The feature of regenerating the permutite by treatment with a solution of common salt, however, is of industrial importance; but whether the entire process offers any advantage over the ordinary method of alum coagulation is still a doubtful point.

The second method of water softening to which reference has been made, is the so-called "luminator" treatment, and its essential feature is subjecting the water to the action of plates of metallic aluminium. The theory to account for the action of the luminator in softening water is that by the passage of the coater over the surface of aluminium a current of electricity is induced, the water acting as the negative pole and the aluminium plates as the positive pole. Therefore a kind of electrolysis of the water takes place which causes them to separate out in an amorphous form when in the boiler. At the same time it is also presumed that some of the aluminium passes into the water either through physical abrasion by friction or by electrical action: It is stated that the best results are obtained with the luminator when the apparatus faces north or south and is exposed to direct light. In the dark the effect of the apparatus is almost nothing. The peculiar feature about water treated by the luminator process is that whatever change is effected appears to be a physical rather than a chemical one. Chemical analysis shows no difference in hardness, etc., between the treated and the untreated water, but the water appears to act differently in the boiler, for instead of the dissolved mineral matter being deposited in the form of an adhering scale, it is precipitated as a loose powder which is readily removed by boiling off.

Practical use of the luminator process, however, does not seem to substantiate all of its claims. While there is no doubt as to it giving very satisfactory results with certain kinds of water (especially with those containing much temporary hardness), it seems to have completely failed in its purpose with other classes of water. There is no doubt but that under certain conditions the process is of considerable merit, but its general utility must be accepted with considerable reserve. When this method of softening water was first announced it was claimed that the treated water had wonderful cleansing properties, especially for the washing of linen and cotton goods. Careful tests, however, have shown the utter absurdity of such an assertion.

The Bleaching Effort of Rain Water.

It has long been known that rain-water exercises a certain degree of bleaching on textile fabrics. In fact, in the old days, before the introduction of the various chemical bleaching agents which are now employed, rain-water had a certain degree of use in the cleansing of fabrics. To account for these facts a recent study made by a member of the French Academy of Sciences, has shown that rain-water contains hydrogen peroxide in solution. This hydrogen peroxide is formed by the electric discharges in the upper strata of the air acting on the moisture which is subsequently precipitated as rain-drops. The rarifaction of the air and the low temperatures which exist at high altitudes are conditions which favor the production of hydrogen peroxide by electric discharges.

Another factor which appears to be active in the formation of hydrogen peroxide in the moisture in the air is that portion of sunlight known as the ultra-violet rays. As everyone knows, ordinary sunlight consists of a mixture of various colored rays, and when these rays are separated by passage of the light through a prism of glass, the sunlight is spread out into a band of color showing red, orange, yellow, green, blue, and violet which are perfectly visible to the eye. We know, however, that there are rays existing beyond the visible violet end of the spectrum; and while these rays do not record a sensation in the eye, they are nevertheless very active in a chemical sense. For instance, they react strongly with the sensitized photographic plate, and they are also capable of inciting certain vigorous chemical reactions which are not induced by the visible rays of light. One of these reactions is the formation of hydrogen peroxide in moist air, which becomes evident in rain-water and in dew.

The whole theory of open-air bleaching, in fact, is based on these two factors: (a) the action of electric discharges and (b) the chemical effect of the ultra-violet rays of sunlight on moist air. Both of these factors result in the formation of hydrogen peroxide. Open air bleaching, therefore, is active not only when the fabric is exposed to sunlight, but even in drizzling or raining weather; for the fabric is even then receiving the bleaching effect of the hydrogen peroxide in the condensed moisture coming from the upper strata of the air.

It is generally admitted that chrome salts (that is, bichromates) are the most searching of mordants, and exercise a powerful oxidizing effect upon both colors and fibers.

Practical Problems Discussed by Cotton's Readers.

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all.

SUPERHEATED STEAM IN TEXTILE MILLS

BY HENRY D. JACKSON.

EDITOR COTTON:

I notice in your March issue, a letter by Robert H. Wyld on Superheated Steam in Textile Mills. In this letter Mr. Wyld speaks of the use of superheated steam in the mills, particularly with reference to the engine, as though it was the easiest possible thing in the world to install and use.

In some cases this may be true, but in many others, notably in the case of most of the Corliss type of engines—a type of engine which is in use in the majority of the textile mills—superheated steam is not practically possible, owing to the construction of the valves. In some of the more modern types of engine of this character, a moderate superheat of from 60 to 75 degrees may be used; but in most engines of this character, unless built in recent years as above stated, superheat cannot be successfully used. Attempts to use it have in a number of instances resulted in wrecked engines and a considerable loss in operating efficiency.

Superheated steam in turbines is a comparatively easy matter. Superheat in the majority of engines is a totally different matter; and the attempt to use it without a careful consideration of all of the difficulties attendant to its use may result very disastrously. It is now well known that the use of superheat, particularly to any considerable extent, requires exceedingly good piping, a radically improved type of valve and fittings over what used to be called for with saturated steam; and many of the disastrous explosions and wreckages of valves and fittings have resulted from the use of superheated steam where the pipe lines were laid out for the use of saturated steam. While it is doubtless true that the size of the pipes carrying steam may be materially reduced with superheated steam over what they might be with saturated steam, it is well to take into account that the losses due to the extreme temperatures may in some cases more than compensate for the reduction in size of the pipe.

Another item of importance concerning superheated steam is the possibility of installing satisfactory superheaters. There are superheaters which will give satisfactory results. There are others which will not. Also, with many boilers it is impossible to install superheaters which will give good results, owing to the comparatively low temperatures of the gases at the point where the superheaters would of necessity have to be installed. I say "of necessity" because if they are installed in any other location, the choking of the passage left for the gases will result in such a great reduction in the draft that it will materially affect the satisfactory operation of the boilers themselves. Under these conditions, the only possible method is to install a separately fired superheater. These not infrequently cost as much as they save.

There is no question as to the saving in condensation by superheat in long pipe lines; neither is there any question as to the efficacy of superheat in all types of engine where it can be used, but it is to be noted that superheat should not be used with any engines or with any pipe lines without first considering whether or not the superheat will seriously injure them. It may also be noted that where superheated steam is used in the engines, more elaborate precautions have to be taken for lubrication, and the chances are that a very different oil will have to be used to lubricate the high pressure cylinder than is now used where superheat is not involved.

While economy at first sight may be great through the use of superheat, it may be found that the extra cost of changing the engine, lubrication, piping, valves and cylinders, as well as the care of the superheater may entirely nullify the apparent saving .

[In accordance with our usual custom, a copy of Mr. Jackson's criticisms were submitted to Mr. Wyld, the author of the article referred to, and his further comments follow.—EDITOR.]

FURTHER COMMENTS ON SUPERHEATED STEAM.

BY ROBERT H. WYLD.

EDITOR COTTON:

Mr. Jackson's letter on the subject of the writer's article in the March issue of COTTON, while admitting most of the advantages obtainable by the use of superheated steam in the textile mill, refers rather vaguely to cases where superheated steam has caused difficulties and does not attempt to show in any way why these difficulties have been met with. Superheated steam has had to meet a good deal of this kind of criticism and because the writer believes your readers are interested in knowing something more definite than the simple pointing out of various possible troubles without showing a way to prevent them, I am taking the liberty of taking up in detail some of Mr. Jackson's unexplained objections and trying to show that they are not real objections at all.

The writer has found, for instance, that a good many engineers like Mr. Jackson consider that the Corliss engine is not suited to use superheated steam, except in moderation, and in view of this the writer quite agrees with them, except as to what should be termed a moderate degree of superheat. Sufficient superheat to obtain marked results in this type of equipment can undoubtedly be used to advantage. The gist of the whole matter lies in the determination of what is moderate for this kind of engine.

There is no question that there have been many ex-

amples of Corliss engine troubles directly attributable to the use of superheated steam. The causes of these troubles can easily be classified under two heads; first, the use of too high a superheat, due to over enthusiasm, or an attempt to obtain in an engine not suited to high temperature steam results similar to those obtained in engines of the poppet or piston valve type, where superheat to a high degree can be used to advantage; and, second, (what at present is undoubtedly the chief cause of trouble), the use of improperly designed superheater equipment, giving fluctuating temperatures, rising at intervals to very high degrees.

The first of these causes was met more often in the early days of superheating in this country when the remarkably low steam consumption of various foreign built engines especially designed for utilizing high temperature steam was noted and an attempt to obtain similar economy in Corliss engines of standard design was attempted. The results were of course disastrous.

There have also been many cases where superheaters have been installed of such design that a wide fluctuation in steam temperature was obtained with varying loads on the boiler, and the writer in his personal experience has run across at least half a dozen instances where a rise in temperature of as much as two or three hundred degrees has taken place in a short period of time, and it is easy to see how this would cause trouble not only to the Corliss valve gear, but also in the lubrication of the engine and the valves and fittings in the steam lines.

Mr. Jackson in speaking of the use of a moderate degree of superheat mentions 60 to 75 degrees. To the writer's mind this is not sufficiently specific. The degree of superheat to be used in any case should be considered on the basis of final temperature rather than simply a degree of superheat regardless of the pressure. The writer has seldom, if ever, seen a plant where steam at a temperature of 450 to 475 degrees cannot be used to advantage, and knows of many cases where steam at 500 degrees has been used successfully in Corliss engines for years, although this is rather higher than necessary. While 450 degrees final temperature at 175 lbs. pressure is equivalent to only 73 degrees superheat; at 100 lbs. steam pressure, it is equivalent to 113 degrees, and the writer believes that for this reason in many old plants, where low pressures and engines of relatively low economy are used, superheaters can be utilized to even greater advantage than in many thoroughly up to date plants where high pressures and compound condensing engines are in use. In either case moderate superheat will show splendid results, not only in the saving of steam and fuel, but in eliminating water troubles, increasing the capacity and improving the lubrication. One of the best known engine builders in the country recently told the writer that an analysis of engine troubles during the past year had shown that an astonishing percentage were due to water troubles and that his firm would in the future strongly advocate moderate superheating.

The same argument holds true of piping, valves and fittings, and the writer does not hesitate to recommend the use of steam at 450 to 475 degrees Fahr., on cast iron fittings, as he knows dozens of plants that have operated for periods of ten years at these temperatures without any difficulty.

Regarding the subject of lubrication, this can no longer be viewed in the light of a real difficulty. The use of a mineral oil is desirable and there are many satisfactory oils of this character on the market at moderate cost.

While there are two or three types of boilers in which it is difficult to place superheaters to advantage, practically all the standard types can easily be equipped so that little difficulty is met with in this regard.

In considering superheat for a given plant, the two points to consider are, first, the use of a moderate temperature, say 450 to 475 degrees Fahr., and second, superheater equipment properly designed to give a practically constant superheat. If these suggestions are followed the writer believes that entirely satisfactory results will be uniformly obtained.

WISHES TO BUY COTTON DUCK.

BY RUBBER.

EDITOR COTTON:

I have just acquired a position where it would be very much to my advantage to know the customs and trade usages in the buying and selling of cotton duck fabrics. What are the essential characteristics of a duck fabric; what is the make-up of standard varieties of ducks; what is the difference between these and the so called special ducks; why are ducks sold at almost the same figure as the raw yarn; in what widths is duck made in this country; and what is the weight per square yard of the principal varieties, are questions that are constantly recurring to me. If it would be possible for you to have some person who is familiar with these details prepare replies to them and at the same time give any other details which would be of advantage to a person interested in the purchase of these fabrics for manufacturing purposes, it would, I believe, be appreciated by a number of your readers who are situated in similar positions.

PLANNING LIGHTING INSTALLATIONS.

BY FRANK B. RAE, JR.*

EDITOR COTTON:

Some months ago, one of your correspondents in writing about the planning of artificial lighting, expressed the idea that those engaged in this work rather expect the mill superintendent to remodel his plant to accommodate a proper lighting equipment. It is somewhat difficult to reply to this criticism without appearing to "knock" some of the people engaged in the practice of illuminating engineering.

As a matter of fact, there is a considerable number of them associated with manufacturers of lamps and lighting equipment whose technical training and engineering ideas are so fixed, that they fail to recognize practical limitations under which the rest of us are forced to do business. I dare say that not one mill in twenty even remotely approaches its superintendent's ideas of perfection, but the superintendent does his best with the material at hand and maintains his output even in the face of certain amount of discouragement. Similarly the practical lighting man is sometimes pretty thoroughly discouraged when he is forced to equip the average mill, but if he is alive to his opportunities he goes to work to overcome these restrictions instead of expecting somebody to remove them.

*Secretary of the Committee on Industrial Lighting for the N. E. L. A., and a well-known writer on the subject of Artificial Illumination.

Your correspondent's criticism is really a criticism of the theoretical engineer and not of the practical lighting expert. The man of theory, as a rule, is a somewhat recent graduate of a technical school who is concerned almost wholly with such abstruse factors as flux of light, angles of reflection and refraction, lumens per watt, mean spherical candlepower, and similar (to us) incomprehensible and unimportant matters. Your practical lighting expert on the other hand, is a man who is concerned in the operating efficiency of the mill or factory he is called upon to illuminate.

His idea is to increase the output, decrease the spoilage, eliminate accidents so far as practicable, cut out the waste time, and give the operative illumination which will be an incentive to faster and more accurate work. Like the efficiency engineer, his idea is to increase production by making it easier to produce more and better work than it formerly was to produce less and inferior work.

If a line of belting interferes with his lighting plan, he will either rearrange the plan or prove to the mill superintendent that it is worth while to change the belting. Where there are so many obstacles to good lighting that it is practically impossible to do anything without removing these obstacles, he will prove to the mill superintendent that the obstacles cost money and that their removal is a matter of economy.

I trust that I have not taken too much of your space in endeavoring to set forth the real ideas of the lighting men of this country. Like the men in every other walk of life, the personal equation is the real test of their value. If the superintendent who wrote to you had an unpleasant experience, it was because the man he was dealing with was a theorist and not a practical man. Let him tear up the impractical recommendations and look about him for someone who knows the problems of mill operation as well as the problems of illumination.

WHY?

BY W. B. W.

EDITOR COTTON:

Seeing that you invite correspondence on textile subjects, I thought that I would like to contribute my mite. I am very much interested in the articles written by subscribers, but I think that most of us know how to figure draft, twist, speeds, and so on, but it struck me that if the older overseers, who have had more experience, would write about the different propositions they get up against, and how they overcame them, it would please a great many of your readers.

Yesterday I solved a problem that has been bothering me off and on for a couple of months. I had a speeder on 4.50 hank roving that had a bad habit of starting up slack for about a third of the way from the foot end of the frame the first thing in the morning, and bothering the tender until she doffed, and then it ran all right until the next morning, when it was the same story over again.

The foot end of the speeder came within two feet of the window and as we have had a very severe winter, I thought that possibly there was a draft of cold air leaking through and striking the frame, but after trial it proved not to be so. The next thing was to try the rail couplings, but everything there was tight. Then I looked the train of gears over for back-lash, but did not find anything there and did not expect to.

Finally I took the front steel roll out and found one roll, about a third of the way from the head, with the square loose and quite badly worn. I had this fixed so as to make the roll tight and have had no further trouble. Now I have found the cause and effect, can anyone tell me *why* the ends should run slack? I know they did, but don't know *why*, because, the foot end runs as fast, and no faster, than the head end, and the cone belt could not be affected. Also, when the roll was running, there must have been drag enough, with the weight that was on the roll, to stop the back-lash from showing. Will someone tell me WHY?

RINGLESS SPINNING.

BY G. N. G.

On March 12, of this year, there was issued by the Patent Office, on the application of Victor Belanger, patent number 1,020,179 for an invention in spinning which in the opinion of many is destined to revolutionize present methods of spinning.

Those familiar with cap-spinning often claim that this system of spinning is capable of producing yarn decidedly superior to the yarn spun on traveler rings or on mules, but the mechanical limitations as to speed imposed by the construction of the cap-spinning device have heretofore rendered it unavailable because of its low rate of production and consequent lack of economy.

By the new Belanger cap-spinning invention these mechanical difficulties have been entirely overcome, it being possible to spin substantially without breakages at a rate of speed that is incredible to those who have not witnessed this system of spinning in operation.

The principle of the invention is applicable to the present style of ring frames since in order to apply it, it is only necessary to lift off the ring rail and substitute a modified form of traverse rail in which are mounted a series of small wheels or idlers, one opposite each spindle. The supporting or traverse rail need not extend on both sides of the spindle, but may be located entirely behind the row of spindles, or if preferred, in front of it.

The building member consists of a hollow cup-like cap, in whose upper contracted end is placed a coupling bushing provided with a small inwardly projecting tongue which extends into a longitudinal groove or keyway formed in the bobbin. The lower edge of the cap rests upon a projecting circular flange of the idler and immediately above this lower edge is a spreading flange to prevent kinking of the yarn against the spindle. The idlers are carried in a small step bearing corresponding precisely to the common type of spindle bearing and its containing bolster is supported in a hollow or tubular rail, the interior of said rail forming a large oil reservoir for supplying each bearing through oil inlet openings formed in the bolster itself. By this construction a large supply of oil sufficient to last for weeks or months is carried in the rail, and this supply can be renewed for all the idlers through a single oil receiving aperture carried by each rail.

Mr. Belanger prefers to employ the filling wind or traverse for both warp and filling, since it permits the use of a short cap whose effective inside depth corresponds

approximately to the length of the "chase" of the cop. This use of the filling traverse for warp spinning is in accordance with the present trend of spinning in Europe.

Since the smallest diameter of bobbin that will pass over the spindle blade is just as practical for all diameters of cop as bobbins of large diameter, this invention makes practicable the use of a metal bobbin, which has advantages over a wooden bobbin since it is possible at low cost to make a perfectly balanced bobbin from a straight metal tube, which will not splinter, warp or bruise, and which cannot be injured by the use of knives in cutting off waste ends of yarn. There seems to be no reason why such a bobbin should not last practically as long as the spindle itself.

The yarn-engaging cap by reason of its key connection with the bobbin is positively driven and is given the proper traverse by the copping or building rail already described, which corresponds to the present ring rail and which carries the bearing members or idlers which lightly engage the lower edge of the cap to form a vertical support and to dis-engage the cap from clutching upon the rapidly rotating spindle through the action of centrifugal force. The cap mechanically acts as a fly-wheel to more perfectly balance the spindle, and is effectively steadied by its engagement with the idler, so that it is possible to drive the spindle effectively without objectionable vibration, or the pumping of oil, at speeds far in excess of any spindle speeds commercially possible on the present ring frame.

Perhaps the feature that is most surprising to spinning experts who have studied the invention is the remarkable firmness of the cop, although the tension on the yarn is very light. This is probably due to the fact that the chief retarding factor that causes the yarn to lag behind and wind on the spindle is the resistance to the air, which at the high speeds at which the spindle is driven is very effective for this purpose. Indeed, the higher the speed the greater the tendency to retardation of the yarn. In a general way the resistance of the air and consequently the tension on the yarn is increased with the increase in diameter or coarseness of the yarn. Another element in retarding the yarn is the idler itself with which the yarn comes in contact at each revolution, the yarn passing between the lower edge of the cap and the adjacent periphery of the bearing wheel without the slightest injury or detriment. In order to keep down the "ballooning," Mr. Belanger has devised an exceedingly clever and simple anti-ballooning device, by the use of which it is claimed to be possible to spin the finer counts of yarn on a frame of 2¾-inch gauge at from 12,000 to 13,000 r. p. m. of the spindle without the use of separator plates at all.

Owing to the superior strength and elasticity of the yarn the question has been raised by spinners as to the necessity or wisdom of giving the warp greater twist than is given the filling. Indeed, it is contended by some mill men that the use of this invention will lead spinners to make their warp of the same twist as their filling, and thus abolish all distinction between the two kinds of yarn. It is probable also that this invention will be particularly valuable for working up short staple not now available for certain grades of cloth. Indeed, a number of spinners from different mills in their endeavor to find some weak spot in its operation have from time to time brought in the poorest quality of roving they could find, but in every case such roving has been spun to their entire satisfaction.

With an increase of production ranging from 50 to 100 per cent. on various classes of yarn, with a substantial absence of breakages and the consequent avoidance of the loss from lap-waste, as well as from the reduced cost of attendance, and especially with the marked advance in the quality of the product, it would seem that this invention is destined to prove a great boon, not only to spinners of cotton, but also to wool spinners and spinners of all kinds of textile fibers.

Plans are now being made to put the invention on the market on a commercial scale. Meanwhile, invitation is extended to all mill men to inspect the invention in operation at No. 62 Sudbury Street, Room 9, Boston. It is reported that large cotton mill interests who are planning substantial increase in spindleage have postponed such increase after having witnessed and studied the operation of this invention, since it is obvious that by the use of this system the present spindle equipment will suffice to very largely increase the output.

An American consul reports that a well known manufacturers agent who is now representing certain lines of English soft goods is desirous of obtaining American agencies for other lines not competing with samples he already carries. He would especially like to travel for general lines of American cotton goods, including prints, ducks, denims, dungarees; imitation leather goods by the yard, for upholstering and furnishing; chenille table covers and curtains; Axminister mats and rugs, etc. Samples should be shipped to arrive about May 15 and November 15, dates on which he starts on winter and summer trips throughout the country in question. Copy of letter from the inquirer, giving further details regarding terms, etc., can be obtained from the Bureau of Manufactures. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file number 7642.

An American consular officer reports that a business firm in his district is anxious to correspond with American manufacturers of aniline dyes for cotton, linen, and wool yarns and prints. A similar request from this firm, published some time ago, elicited no responses from firms in the United States. Leaflets, showing how this firm advertises the goods it carries, accompanied the report and will be loaned to interested firms by the Bureau of Manufacturers. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to File No. 7932.

An American consul has forwarded a sample of cloth, known in his district as American blue demin, which was furnished by a local importing firm. This firm states that this cloth is made in the United States in various weights, and its object in submitting the sample is to ascertain the best means of entering into direct communication with one of the leading mills in the United States for the sale of this kind of cloth in the country in which the firm is located. The house states it is prepared to establish the usual bankers' credits, thus enabling the makers to cash in America proper their drafts without recourse on the drawers, if so desired. The main thing desired is to establish with some leading manufacturer a direct and steady trade, the prospects of which are very promising. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 7981.

NEW MACHINERY AND TRADE NOTES.

THE HIGH COST OF LIVING.

Cotton Chats, published by the DRAPER COMPANY, Hopedale, Mass., said in a recent issue that "the high cost of living is at present receiving the attention of all classes of people in practically every country on the face of the earth. It serves as a headline in the columns of the papers when in want of a space filler; it is a favorite text for belated sermons; and it fills the hats of political orators.

"With increasing prices of raw materials and increased wages of operatives, any improvement that reduces costs by rendering labor more efficient is of great economic importance. The Northrop loom through its automatic devices enables the weaver to tend from two to four times as many looms as common looms on the same class of goods. It causes two to four yards of cloth per weaver to grow where formerly there was but one.

"That many of the best cotton mills realize the truth of the above is shown by an analysis of our loom shipments for 1911. Of 21,015 Northrop looms shipped, 15,233, or over five-sevenths of the entire number replaced common looms which were consigned to the scrap heap, not because of wear, but because the mills could not afford to operate them in competition with other mills equipped with Northrop looms containing labor-saving improvements. It is interesting to note that of the 15,233 Northrop looms replacing common looms more than four-fifths were in the Northern States.

"With over 200,000 Northrop looms in operation in this country, some of which were started about sixteen years ago, it follows that there must be parts needed for repairs from time to time. Recognizing the importance of furnishing such repairs promptly and made with the same tools and fixtures as the original parts, we have added to our shop equipment to increase the output when needed and have built an extensive storage system so that we can carry a large quantity of finished repairs ready for immediate shipment. We have also arranged similar storage facilities at our Southern headquarters in Atlanta, Georgia. We carry in the aggregate from 12,000,000 to 16,000,000 pounds of loom repairs and are now able to make immediate shipment of many orders as soon as they are received and properly entered.

"On goods that must from the nature of the case be made to order we can make deliveries in much less time than formerly.

"Our foundry has always had a reputation for making the best quality of castings as to softness and finish. Parties ordering castings for loom repairs of local job foundries should remember that castings made from loom parts finished up for patterns will have an additional shrinkage so that they will differ materially in measurements from the original pieces furnished by us on the looms and also from those we furnish on repair orders. 'Cheap' loom repairs are usually an expensive investment."

The Victoria Cotton Mill of Rock Hill, S. C., the Jackson Fibre Co. of Bemis, Tenn., and the Brookford Mills, Brookford, N. C., have installed the Kinkead Apparatus for aligning and leveling shafting.

MORE LIGHT.

It is often said that the darkest hour is just before the dawn. Now that the dawn has arrived, many textile manufacturers are beginning to "see a great light" and to realize that this "great light" is merely the reflection from Rice's mill white paint that is being applied to the factories of their nearby contemporaries. Truly, it is "The paint that brims over with sunlight." Insurance inspectors are often heard to declare that no dirty corners are found in a mill whose interior is painted with Rice's Mill White, because there are no dark corners in which to hide the dirt and the operatives, imbued with the cleanliness of their surroundings, naturally follow the trend of the times and put the dirt and waste in their proper receptacles.

The manufacturer who uses Rice's Mill White on the ceilings and walls of his factory increases the direct sales of his product, because his plant is made so light, sanitary and clean that it creates an instantaneous and favorable impression in the minds of visiting buyers shown through it. He also increases the working efficiency of his operatives in two ways: First, they can produce a better quality of work, because of their ability to see clearly what they are doing; second, they are not afflicted with that sleepy feeling that naturally affects any human being when surrounded by a partial twilight. Any student of efficiency knows the bad effects of a waning light on the efficiency of an operative. This has been demontrated many times by illuminating engineers in explaining the needs for better lighting facilities. This effect is never felt in a mill where the ceilings and side walls are coated with Rice's Mill White, because whether the transfusion of light is from the windows or from the electric globe, the great reflective brilliancy of Rice's Mill White gives exactly the same ultimate results.

A booklet entitled "More Light," has been issued by the UNITED STATES GUTTA PERCHA PAINT CO., of Providence, R. I., the originators and sole distributors of Rice's Mill White for the factory interior, and Rice's Reinforced Paint for use on the operatives' houses and other exterior surfaces, and will be sent to anyone free of charge on application.

"The Tale of the Tag" is the name of a 16-page booklet which is being distributed free of charge to all inquirers by the DENNISON MFG. CO., 26 Franklin St., Boston, Mass. This booklet is the first of the new series of Dennison books. Three others are to be published as follows: in May, "The Adventure of Jim, John and Jane;" in November, "Dennison's Christmas Book;" and in January, 1913, "Dennison's Crepe Paper Almanac." The Tale of the Tag is written in a bright and interesting manner and judging from this first one, the whole series will probably become very popular as they are distributed.

NOTICE OF REMOVAL.

The D. Van Nostrand Company announces the removal of its offices and sales room to larger quarters at 25 Park Place, between Broadway and Church St., New York City.

OLD FAITHFUL.

About the year 1806, Lewis and Clarke's party was returning from its celebrated expedition across the continent and, when near the mouth of the Yellowstone River, a member, John Colter, asked for and received an honorable discharge.

He and his companion, Potts, were captured by Blackfeet Indians. Potts was killed, but Colter miraculously escaped and lived for a year or more among the friendly Bannacks, whose range included what is now the Yellowstone Park.

The year 1810 found him back in Missouri telling weird tales about lakes of burning pitch, enormous hot springs and geysers. Even in those days Missouri people had to "be shown" and they jocularly referred to the region he described as "Colter's Hell."

Doubtless he was the first white man to see the marvelous Old Faithful Geyser shown herewith. Since that time, thousands have, in wonder, watched its eruptions, which occur with clock-like regularity every sixty-five minutes.

From its crater, which is about two feet by six, there is thrown vertically for four and one-half minutes, a great mass of hot water and steam to a height of one hundred and fifty feet, after which all activity ceases for another hour.

A century has passed since Colter saw this remarkable Geyser, but in all these years it has never failed to go into action at the expected time, and hour after hour, day and night, summer and winter, it goes on spouting with such certainty that it truly merits its name—Old Faithful.

The accompanying photograph and description occupy the front page of a recent folder sent out by the TOLHURST MACHINE WORKS, of Troy, N. Y., makers of the well known Tolhurst hydro-extractor. Years have passed since W. H. Tolhurst developed the principle of the oscillating step, which makes his extractor famous.

"* * * in all these years it has never failed to go into action at the expected time, and hour after hour, day and night, summer and winter, it goes on whizzing with such certainty that it truly merits its name—Old Faithful."

On May first the New York offices of Underwriters' Laboratories will be consolidated at No. 135 William Street, in charge of Dana Pierce, Electrical Engineer and agent at New York. Mr. Pierce has been in charge of the electrical department of the laboratories at the principal office in Chicago during the past six years, and is well and favorably known.

A station for testing electrical appliances will be operated in connection with the New York offices, and be used chiefly in the service of inspections at factories and labeling. After May first applications for tests of electrical fittings may be made either at the principal offices and testing station at Chicago, or at the offices in New York.

OLD FAITHFUL GEYSER AT SUNRISE.

THE RECORD OF A SUCCESSFUL MAN.

Cotton manufacturers will be interested to learn that J. M. Smith, who was at the head of the Industrial Lighting Department of the Buckeye Electric Works, of Cleveland, will, after May 1st, have charge of similar work at the Nelite Works of the General Electric Company of the same city.

The Nelite Works is a recent consolidation of the Holophane Company and the Fostoria Glass Specialty Company, and is undoubtedly the largest concern now engaged in the manufacture and sale of illuminating glassware and reflector equipment.

Mr. Smith's experience has been gained almost wholly

J. M. SMITH.

in practical lines. Starting as an operative in a textile mill, he advanced entirely through his own efforts, until today he stands practically at the head of his profession. This is the more remarkable, as Mr. Smith has no technical education and has won his spurs in competition with the men of the most thorough scientific training.

It is not too much to say that the Buckeye Electric Works and the Holophane Company have been the two largest factors in the development of industrial lighting in this country. This development has progressed along the lines of efficiency engineering, the idea being that proper illumination facilitates manufacture and decreases cost of production.

In his new connection, Mr. Smith will have the benefit of long experience in the incandescent lamp business as well as the backing and prestige of the company which ranks first in the development of the art of illuminating engineering.

GRINNELL WILLIS & Co. become the sole agents from April 1st, 1912, of the Wallace Mills, of Jonesville, S. C., and the Walhalla Cotton Mills, of Walhalla, S. C., which are controlled by the Parker Cotton Mills Co., of Greenville, S. C.

The A. WILHELM Co., of Reading, Pa., paint specialists since 1857, are the manufacturers of a dry sized powder, called "Ednore," which is ready to use when mixed with water. This hygenic, durable, wall finish is excellent for plain tinting and decorative work on interior walls and ceilings. It is absolutely non-poisonous. It covers well with one coat, spreads easily, and is ready for immediate use when mixed with cold water. One pound will cover from 60 to 100 square feet, according to the kind of surface to be covered. To produce permanent work all dirt and old calsomine should be washed off before applying. It is applicable for use in any part of the world as a durable and sanitary calsomine. A color card will be forwarded gratis on application to the manufacturers.

Men of the stone age could make steam by pouring cold water on hot stones, but 5,000 years passed before man discovered it could be used for motive power. Wire heddles were in use several generations ago, but it was only recently that mill owners discovered that the heddle should be a fixed permanent equipment and made of steel. When made in this way, it is a part of the loom, a detail of the machine and not a running and endless expense. The flat steel heddle is made of cast steel, with a perfectly smooth and round cornerless eye, stamped out of the flat stock. It is manufactured by the STEEL HEDDLE MFG. Co., 2110 Allegheney Ave., Philadelphia, Pa., where a package of samples is waiting for your inquiry. Just say on a post card, "Send samples and prices."

Among the interesting exhibits at the Third Textile Exposition at Boston was the longest fly frame ever built, (The Whitin Machine Works); an automatic filling replenishing box loom weaving in two, four and six colors, (The Crompton & Knowles Loom Works); an automatic loom for fine goods using cut instead of cast gears, giving, with, absolutely no variation, a certain prearranged number of picks per minute, (Draper Co.); Hardman's patent duplex carding device, (Howard & Bullough American Machine Co., Ltd.); a new system of cotton ginning; a machine for cleaning, opening and blooming cotton in the picker room; a tape drive for ring spinning and twister frames; and a method of automatic humidification. Prominent among those exhibiting were:

The American Moistening Co.; Allis-Chalmers Co.; American Tool & Machine Co.; Boston Belting Co.; Barber-Coleman Co.; Bireh Bros.; H. W. Butterworth & Sons Co.; The Cork Insert Co.; Crompton & Knowles Loom Works; The Draper Co.; Easton & Burnham Machine Co.; Eureka Fire Hose Manufacturing Co.; Fales & Jencks Machine Co.; Foster Machine Co.; General Electric Co.; John Hetherington & Sons, Limited; Howard & Bullough American Machine Co.; Kitson Machine Shop; Oneida Steel Pulley Co.; Potter & Johnson Machine Co.; The Stafford Co.; Henry L. Scott & Co.; Saco-Pettee Co.; U. S. Gutta Percha Paint Co.; Universal Winding Co.; Woonsocket Machine & Press Co., and The Whitin Machine Works.

The BERLIN ANALINE WORKS, 213 Water St., New York City, are sending out a color card to the trade describing their Metachrome Violet B., together with samples and dyeing receipts. This color card, which is known as 770 A, will be gladly forwarded to interested parties on application to the office of the company in New York.

C. E. RILEY, Pres.
Boston Office
65 Franklin Street

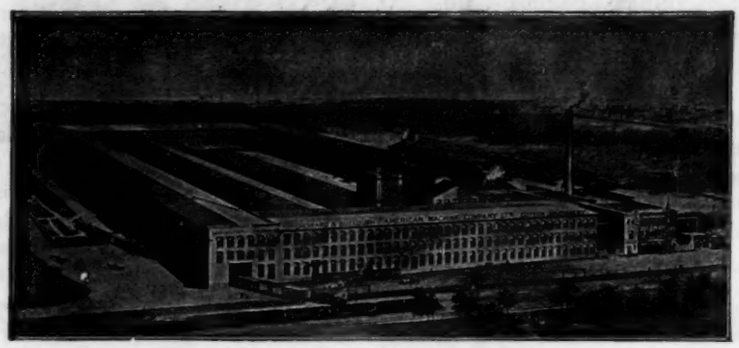
Southern Offices
814-815 Empire Bldg.,
Atlanta, Ga.

H. & B. AMERICAN MACHINE COMPANY

PAWTUCKET, R. I.

COTTON MACHINERY

Are You Interested to know what is the best?



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WE INVITE YOUR INVESTIGATION AND COMPARISON

BOOK REVIEWS.

COLOR MATCHING ON TEXTILES. By David Patterson, F.C.S., F.R.S.E., 123 pp., 29 illustrations. Colored frontispiece, and 14 dyed patterns in appendix. Price, 8 shillings postpaid. Published by Scott, Greenwood & Son, 8 Broadway, Ludgate Hill, London, E. C., England.

This book is a manual intended for the use of dyers, calico printers, textile color chemists, and students. The subject is a comprehensive one, comprising as it does the study of color preception and qualities of daylight, the optical fibres and dye stuffs employed, and also the influences of artificial illumination on color appearances. A partial contents of this book is indicated by the following selection of subjects from its various chapters: Light and Color Sensation; Light Waves; Color Vision; Primary Color Sensation; Complimentary Colors; Daylight Standard; Diffused Daylight; Pure Daylight; Selection of a Pure Light; Variability of Daylight; Matching of Hues; Examining the Purity of Colors; Matching Difficulties arising from Contrast; Color modifying influences in Dyed Textiles; Optical Properties of Dye Stuffs; Matching of Silk Trimmings, Linings, Etc.; Studies on the influence of the absorption spectrum in the changes of hue under artificial light; and Unreliable Dyestuffs. Particular interest will be attached to this work because of the fact that its author is a well-known contributor to the columns of COTTON. Further interest will be created by the advance information that he is now preparing for the dyeing, bleaching, and finishing department of COTTON, a series of articles on the appearance of colors under the artificial illuminants. This will be a series of separate papers which will treat all phases of this subject in a very thorough manner and when read in connection with this book will prove of intense interest and value to the student of colors and their apparently conflicting theories and phenomena.

THE SCIENCE OF COLOR MIXING. By David Patterson, F. C. S., F. R. S. E. 124 pages; 41 illustrations; 5 colored plates, and 4 dyed specimen plates. Price, 8 shillings, postpaid. Published by Scott, Greenwood & Sons, 8 Broadway, Ludgate Hill, London, E. C., England.

This book deals in a practical manner with the science of mixing ordinary colors and dyes and is thus applicable to the common, everyday duties of the dyer, and colorist. It is also arranged in such a manner as to be an exceedingly useful compliment to the class lectures of students in textile colleges. The author has tried to make these difficult subjects as clear and lucid as possible and both of these books have, we understand, been adopted as text books for the students of several color and dyeing colleges among which are the Bradford and Leeds technical colleges of England. All readers of COTTON who well remember Mr. Patterson's series on "Color Harmony" which appeared last year will at once realize the great interest and value of both of these books to both the student and the practical man.

COTTON CHARTS OF THE NEW YORK COMMERCIAL. Ten year range from 1902 to 1911. Published by the New York Commercial, 8 Spruce St., New York City. Price, $1.00.

This paper bound booklet with pages 9 by 12 inches, contains a quantity of cotton statistics besides the ten pages of charts showing the fluctuations of the New York future

cotton market for each successive year from 1902 to 1911 inclusive. It gives at a glance the variations of the New York future market during past years, with such influences on futures that played a greater or lesser part in the several moves as they occurred written in on the chart. These charts will undoubtedly prove of immense value to the close follower and student of cotton market conditions.

The Standard Price of Cotton. By Henry Rawie, 115 pages. Bound in paper. Price, 25 cents. Published by Henry Rawie, 1201 American Bldg., Baltimore, Md.

This is No. 12 of the science of value series and is a collection of short, pithy, essays on the subjects indicated in the chapter headings. The chapter headings are as follows: The gold standard; the standard price of capital; the origin of capital; the distribution of capital; the failure of reproduction; the finance system; the failure of finance and remedies. It is a book that will be read with interest by all thoughtful people.

Productive Costs in Cotton Spinning Mills. By Arthur H. Hardman, member of the Textile Institute, and associate of the Charter Institute of Secretaries. 119 pages. Price, 3 shillings and 6 pence net. Published by Emmott & Co., Ltd., 65 King St., Manchester, England.

This is one of the series of "Textile Manufacturer Manuals." The greater portion of the book originally appeared as a series of articles in the pages of the Textile Manufacturer of Manchester. It contains numerous tables and charts and is an endeavor to evolve a practical method of securing a complete system of cotton yarn costs, which shall be on the one side sound from an accountants point of view, having as its basis the books of the concern; and on the other hand be sufficiently practical to take into consideration all the details and problems and the processes of manufacture, so far as they affect the cost of the product. This book deals with the principles of the subject and these principles are applicable to all mills as they are illustrated by numerous examples. The figures used in the tables are employed merely for the purpose of illustration and not to illustrate any actual cost from any actual plant. The subject is treated in a very thorough manner and will be received with great interest by all students of factory costs, while many of the figures given in the illustration are in English money, as above stated this is merely for illustration and in practical use the amount substituted would be the amount found to be the costs in the actual mill under consideration.

The American Directory of Hosiery and Knit Goods Manufacturers of the United States and Canada for the year of 1912 has just been issued. This directory contains maps showing the location of mill towns together with lists of manufacturers classified according to goods made; manufacturers selling agents for knit-goods; New York knit-goods buyers; jobbers handling knit-goods; and department stores and large retailers buying knit-goods. This is the 30th Annual Directory of Hosiery and Knit Goods Manufacturers published by the Lord & Nagle Company, 144 Congress St., Boston, Mass. Copies of this directory will be sent postpaid for $1.50 a copy upon application to Cotton, Atlanta, Ga.

Aligning Shafting and Machinery. This subject which has been made a special study by Geo. W. Loggie, treasurer of the Kinkead Mfg. Company, 7 Water Street, Boston, Mass., is covered in part in an illustrated pamphlet of 34 pages prepared by Mr. Loggie for general distribution and may be had upon request. It will serve to indicate what, and how large has been the saving in a number of specific plants of a proper readjustment of the shafting and machinery. The illustrations not only show the special target employed and give an insight into the method of ameliorating plant conditions, but include diagrams of the different conditions found in different plants. Write for a copy at once as the matter is well worth your careful attention. It means the saving of dollars in your plant.

The Farbenfabriken of Elberfeld Co., 117 Hudson St., New York, are sending to the trade a number of new color cards describing some of their latest productions for textile work. Among these are Algole Brilliant Red 2 B. paste. Diazo Yellow R.; Plutoform Black L.; Benzo Fast Scarlet 5 B. L. and 2 G. L.; Benzo Fast Blue 4 G. D.; Para Chyrsoine M. K.; and others. These color cards also contain dyeing receipts and other data of interest to the practical dyer and printer in his work.

The Casella Color Co., of 182 Front St., New York City, are sending to the trade their supplements No. 74 and 75, describing respectively Diamine Fast Violet B. B. N. and Diamine AZO Scarlet, 6 B. L. Extra. These supplementary color cards not only contain samples of materials dyed with these dyes, but also contain directions for dyeing, together with the various properties of the dye stuffs. They will be sent to interested parties upon application.

ANNOUNCEMENT.

The Dillon Mills, of Dillon, S. C., take pleasure in announcing, to those interested in textile manufacturers, the purchase of the plants of the Dillon Cotton Mills and Maple Cotton Mill, located at Dillon, S. C., and the Hamer Cotton Mill, located at Hamer, S. C., and solicit your consideration.

The LaGrange Mills, LaGrange, Ga., have recently added to their present group of mill buildings an opening room and waste house, one story high, 92 x 85 feet. The machinery in the opening room is to be driven by rope drive from the main mill and consists of the following equipment, furnished by the Kitson Machine Shop: One bale breaker feeder, one 5-cylinder waste machine, one 2-cylinder waste machine, and four automatic feeders.

Under the direction of the same engineers a re-arrangement has been made of the machinery in the main mill. This necessitated the installation of one breaker picker, two intermediate pickers, and one finisher of Kitson make and the following machines manufactured by Saco & Pettee: 36 40-in. cards, 28 first delivery drawing frames, 28 second delivery drawing frames, 2 slubbers of 76 spindles each, 8 intermediates of 96 spindles each, and 24 ring frames of 192 spindles each. The fire protection system has been revamped and the supply of the new equiment is from a 50,000 gallon tank.

Barrett Specification Roofs

A CONCRETE CITY

Covered with Barrett Specification Roofs

IN the illustration below the Turner Construction Company of New York has brought together in a scale drawing and accurate representation of most of the important modern concrete buildings which they have erected during the past nine years, at an approximate cost of $12,000,000.

It is an imposing display of best types of modern construction—"a concrete city" indeed—scientifically designed for maximum service at minimum cost and minimum maintenance.

In the use of concrete the designers of these buildings planned for economy—the real economy that results from adequate strength and no repairs.

Barrett Specification Roofs are a real economy, and it is significant that 95 per cent of the entire roof area is covered with this type of roofing. The figures are as follows.

Barrett Specification type of Roofs	1,490,523 sq. feet
Plastic Roofings	14,714 sq. feet
Slate Roofings	21,640 sq. feet
Tile Roofings	5,619 sq. feet
Ready Roofings	38,381 sq. feet
Copper Roofings	6,355 sq. feet
All other kinds	7,448 sq. feet

It is important to remember that while all these buildings were constructed by the Turner Construction Company, the specifications were drawn by a large number of architects and engineers. That the great majority of these specified a Barrett Specification type of roof, emphasizes the fact that whenever this roof is practical the best modern engineering practice will have no other kind;

These roofs were selected for one reason only, namely, that they would give *better* service at *lower cost* than any other roof covering.

Barrett Specification Roofs require no painting or similar attention—in other words, there are no maintenance costs. They will last upwards of 20 years without any care.

That the above statement is conservative may be realized from the fact that roofs of this type have lasted, without attention, for thirty-five years and are still in serviceable condition.

The superior economy of Barrett Specification Roofs justifies their adoption not only on big first-class concrete buildings, but on every flat roof building from a tenement to a sky scraper—from a small mill to a modern manufacturing plant costing millions—but be sure it's a real Barrett Specification Roof—and the only way to be sure is to incorporate The Barrett Specification in full in your plans.

Copy of The Barrett Specification with diagrams free on request Address our nearest office.

BARRETT MANUFACTURING CO.

New York, Chicago, Philadelphia, Boston, St. Louis, Kansas City, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New Orleans, Seattle, London, England. Canadian Offices:—Montreal, Toronto, Winnipeg, Vancouver, St. John, N. B., Halifax, N. S.

TRADE B MARK

When visiting Boston you are interested in knowing just where to locate, in the right kind of a hotel, for the accommodations you desire. Diagonally across from the State House on Beacon Hill is a hotel, "The Commonwealth," of strictly modern fireproof construction, ten stories high, 212 rooms, from and above the sixth floor of which an unobstructed view may be had for ten miles toward every point of the compass. The location is within three minutes' walk of Boston Common, State House, Court House,, Scollay Square, Tremont Street, and Elevated and Subway trains, six minutes to theatres, and the principal shopping districts. Five and ten minutes to North and South Stations. Make "The Commonwealth" your Boston headquarters.

Arabol Gum G, one of the staples of THE ARABOL MANUFACTURING CO., New York, when used in its pure state gives excellent results in light or heavy sizing of cotton warps and is especially recommended for use on export goods, such as China shirtings, drills, denims, coarse or medium goods, etc. Mixed with starch it gived it more volume and adhesive power and adds elasticity and tensile strength.

THE OFFICE BUILDING OF THE PACIFIC MILLS PRINT WORKS.

The Pacific Mills constructed a new print works department at South Lawrence, Mass., which is remarkable among textile plants for its size. The five buildings have a total floor area of more than sixteen acres and this amount will eventually be nearly doubled. The office building of this plant alone has two acres of floor area. It was designed by Lockwood, Greene & Co., of Boston, engineers for the Pacific Mills, who were also designing engineers for the entire plant.

The office building is 252 feet long by 90 feet wide and consists of three stories and basement. The latter is used for roll storage and other miscellaneous purposes. On the first floor are the offices and stock rooms, and the engraving and machinery departments occupy the entire second floor. The third or top floor is devoted to the designing department.

The building is of standard slow burning mill construction with cast iron columns on the first story and wooden columns for the two upper stories. The columns and building walls are carried on concrete piers in the basement. The flooring of the second story consists of three inches of deafening felt laid on top of three-inch hard pine underplanking with one-inch maple planks laid on top as a floor surface. The flooring of the first and third stories is identical with that of the second story except that the felt is omitted. The vault elevator and entrance hall which are located in the center bay are surrounded by a fire wall. Another elevator and staircase occupy one quarter of one of the end bays on the opposite side of the building from the main elevator and entrance shaft. The roof construction is of the saw tooth type with alternate saw tooth and flat roofing extending the entire width of the building, spaced to correspond to the width of column bays.

MILL NEWS.

Notices of mill projects, additions or improvements are solicited for this department.

ALABAMA.

SYLACAUGA. The Central Mills at Sylacauga, are overhauling their entire plant and it is probable that additional equipment will also be purchased before the mill resumes its regular work. The present equipment is 25,500 spindles.

ARKANSAS.

CAMDEN. It is reported that the business men of Camden are planning the organization of a company with the intention of building a cotton mill. A. L. Morgan is among those heavily interested.

CONNECTICUTT.

PLAINFIELD. The capital stock of the Lawton Mills Corporation has been increased from $600,000 to $900,000, a certificate to this effect having been filed by the company.

KILLINGLY. The Attawaugan Co. is to install 50 new fancy looms in its plant very soon. These looms are to replace others now in use.

GEORGIA.

BARNESVILLE. The improvements noted sometime ago at the Gem Knitting Mills at this place have been completed. The mill is now electric driven throughout and contains new dyeing machines, new warehouse facilities, some new knitting machines, new finishing machines, new bleachery, and new dye house. The daily output is about 400 dozen garments of women's underwear.

NEWNAN. It is reported that the McIntosh Mills are about to add considerable new machinery to the present equipment.

COLUMBUS. The Bibb Mfg. Co. will enlarge its plant at this place by the erection of a weave shed, which will probably be finished and the machinery in operation by the 15th of July.

BERRYTON. The Berryton Mills have added about 3000 spindles and acompanying machinery in order to take care of the increasing demand for high grade hosiery yarns.

KENTUCKY.

COVINGTON. It is reported that the Reliance Textile & Dye Works are seeking to secure a suitable location for their plant. They wish to enlarge and are unable to secure a location at Covington that is satisfactory to them.

LOUISIANA.

NEW ORLEANS. The rumor published a short time ago to the effect that Maginnis Mills were intending to resume operations is becoming much stronger. It is reported that the capital to back the reorganization is coming from both local and outside sources. William T. Maginnis of the firm of Thorn & Maginnis, who is largely interested in the property has been for some time working to perfect some plan by which the plant would again operate.

MASSACHUSETTS.

WALTHAM. The new sheeting department of the Waltham Bleachery is employing at present about 175 operatives. It is evidently proving a successful venture.

FITCHBURG. The Parkhill Mfg. Co. are to build a new store house 100x137 feet, four stories high.

HOLYOKE. It is understood that the Germania Mills have completed plans for increasing the equipment of their French spinning department.

MISSOURI.

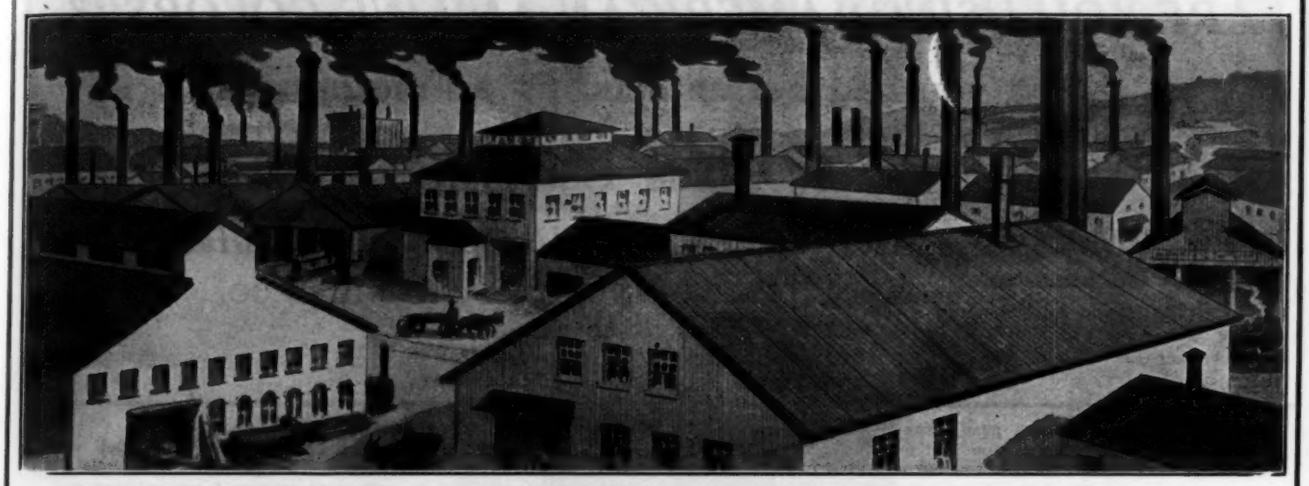
ST. LOUIS. The Good Stocking Co. has been incorporated at St. Louis with a capital stock of $25,000. T. C. Connor, P. L. Turey, and John S. Manchester are among the incorporators.

NORTH CAROLINA.

CAROLEEN. The Henrietta Mills, of Caroleen, have installed the Kinkaid apparatus for aligning and leveling shafting. This makes four Southern mills within a period of as many weeks that have adopted this up-to-date method of eliminating excessive frictional loss from shafting.

CHARLOTTE. It is reported that J. W. Canon, head of the Canon system of cotton mills in North Carolina has arranged to take over the plant of the Bar Ridge Mfg. Co., of Rockwell. This mill has a capacity of 3,000 spindles. It is reported that the capacity of the mill will be doubled, and the yarn product used by the cloth mills of the Canon Company.

CHARLOTTE. The Thayer Mfg. Co., which was reported sometime ago as being incorporated under the laws of Massachusetts, with $500,000 capital stock for building a 25,000 spindle cotton mill near Charlotte, has concluded a deal whereby it comes into possession of the Townsend land in Paw Creek township, containing 31 acres on which it will locate the plant. The Piedmont & Northern Interurban Railway and the Sea-



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Some of these imitations look like RU-BER-OID, but that is merely on the surface. The roofing buyer cannot see what is underneath, or he would not be fooled into buying the goods on their appearances only.

As a house built on a poor foundation cannot last, neither can a roofing founded on poor material give the service expected of it.

Take none but the genuine

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Accent on the "RU" and always spelled with one "B"

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ROOFING

RED—BROWN—GREEN

The only permanently colored prepared roofing.

The ideal roofing for Bungalows, Cottages—in fact suitable for any building where artistic effect is desired.

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ARE YOU USING "AMERICAN ANILINE COLORS"?

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board Air Line tracks both pass through this property, which is admirably adapted for cotton mill purposes. The officers of the company are Jno. Thayer Lincoln of Fall River, president; O. A. Robbins of Charlotte, treasurer; and C. B. Skipper, of Lancaster, S. C., superintendent. The equipment will consist of 25,000 spindles and 500 looms with the necessary preparatory machinery.

HENDERSON. The Cotton Fibre and Mattress Co. is being organized and will be incorporated with $50,000 capital stock. Edwin B. Taylor will be the general manager.

BESSEMER CITY. It is rumored that a new mill will be built at this place by the Harborough Company.

MARION. The Marion Mfg. Co. have made announcement that new equipment will be added to their mill. They are to extend the main mill building 100 feet and erect a new cloth room. Two new boilers will be added to the plant and a low pressure cylinder added to the present Corliss engine, making it into a compound Corliss engine. Also 48 spinning frames and 292 looms with the other preparatory machinery.

DURHAM. The stock of the Durham Hosiery Mills has been increased from $1,000,000 to $1,750,000. At a recent meeting of the directors and stockholders the president was authorized to dispose of $200,000 of preferred stock at once, the proceeds of which are to be used in improving four of the five mills of the company. It is reported that President J. S. Carr, Jr., has made arrangements with various banks to handle this issue and the improvements will be begun at once and pushed to completion. They are installing a mercerizing plant and are to begin at once in the manufacture of a 25-cent grade of hosiery, where heretofore they have been handling principally a 15-cent grade. This company evidently intends to be equal or superior to any other plant of its kind in the world.

OXFORD. It is reported that H. M. Shaw, of Oxford, intends to install a small plant for the manufacture of carpets for buggy bottoms. He is in the market for data and prices for the necessary machinery.

GRAHAM. It is reported that Oneida Mills, of this place, will make additions to the carding and spinning department within a short time.

MT. PLEASANT. The James Knitting Mills are soon to resume operations, having changed the class of their production to ladies' hosiery. They formerly manufactured men's half hose.

CUMBERLAND. It is reported that the J. Frank Houston Co. are considering an addition to their plant, that will add approximately 8,000 spindles.

NEWTON. It is locally reported that J. M. Setzer is actively engaged in trying to secure the location of a knitting mill at Newton.

HENDERSONVILLE. The Freeze Hosiery Mills Co. has been organized with a capital of $25,000 to establish a plant with a daily capacity of 240 dozen pairs of hosiery. It is to erect a brick and stone building and install approximately 40 knitting machines, dye plant, electrical power, etc. R. P. Freeze is secretary and treasurer.

ROANOKE RAPIDS. The Rosemary Mfg. Co. is reported as considering a number of improvements and additions in connection with its plant. Contracts for buildings have already been awarded to C. C. Thompson & Bros., of Charlotte.

LINCOLNTON. The Piedmont Mfg. Co., of Lincolnton, has been reorganized and formed into the Rolin Mfg. Co., with H. S Robinson as president and treasurer. It will install a $2,500 steam plant, 2,300 spindles, and other machinery.

MAYODAN. The Avalon Mills of this place that were burned down in 1911 have decided not to rebuild. It is reported that a hydro-electric plant is to be built there instead.

PENNSYLVANIA.

NORRISTOWN. It is reported that Louis C. Taubel, who operates the Star Knitting Mill at this place, has purchased a tract of land on which he will erect another large knitting mill.

RHODE ISLAND.

PROVIDENCE. The plant of the Imperial Finishing Co., formerly the Shawmut Co., changed hands when J. R. Butterworth, the general manager, sold his interest to Samuel Priest of Providence. Mr. Butterworth intends to retire from business. The plant which is at Bellefont, near Auburn, R. I., after various vicissitudes came under the control of Mr. Butterworth in 1911. Mr. Butterworth was formerly the manager of the Clyde Bleaching & Printing Co., of Riverpoint, R. I., which is owned by the S. H. Green & Sons Corporation. He was also identified with the American Print Works and the Pacific Print Works.

SOUTH CAROLINA.

UNION. It is reported that the Union Buffalo Cotton Mills are to build and equip an auxiliary steam power plant to be used in times of low and flood water. This will cost approximately $150,000. Ordinarily the mill operates by electric power.

CHARLESTON. The plant of the Royal Bag & Yarn Mfg. Co., the sale of which has twice failed, because of an inability to secure bids, has at last been sold to F. W. Wagener & Co., who bought the property for $102,000. No statement has been made by the new owners as to the future disposition of the property.

LANCASTER. It is reported that the Lancaster Cotton Mills are equipping about 200 of their looms with the Caldwell-Gildard warp stop motion.

EASLEY. The Glennwood Cotton Mills, of Easley, have just purchased a new 1,200 hp. cross-compound, condensing engine, made by the Wisconsin Engine Co.

JONESVILLE. It is reported that the Wallis Mills, of Jonesville, have completed arrangements whereby Grinnell, Willis & Co. became on April 1st sole selling agents for the company. The Walhalla Cotton Mills, of Wahalla, S. C., also sell their products through Grinnell, Willis & Co.

CHARLESTON. The General Asbestos & Rubber Co., of Charleston, has doubled the capacity of its textile department. This company manufactures asbestos cloth and packing.

TENNESSEE.

ROGERSVILLE. It is reported that the citizens of Rogersville have subscribed the sum of $50,000 toward the establishment of a knitting mill at that place.

CHATTANOOGA. The Davis Hosiery Mills, of Chattanooga, have increased their capital stock from $25,000 to $50,000.

TEXAS.

BRADY. It is reported locally that J. T. Mann is actively trying to have a cotton mill located at Brady.

DALLAS. The Consumers Lignite Co., of Dallas, is reported as being considering the erection of a small cotton mill.

UTAH.

EPHRAIM CITY. It is reported that the Sanpete Knitting Works of this place have contracted for the erection of a mill building to be built east of the present mill. This company manufactures children's underwear and union suits.

WISCONSIN.

MILWAUKEE. The Mechanical Appliance Co., of Milwaukee, makers of the well-known Watson motors, has just completed the erection of a new office building adjoining the manufacturing plant. The extension in both the direct current and alternating current types of Watson motors, which are being used extensively in the textile industry, has made necessary some extra factory space. The removal of the office force and engineering department to the new building will make available the vacated section for manufacturing purposes.